A Database Publication

THE MICRO USER

Volume 4
Number 11
January 1987
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Top-selling guide to the BBC Micro!

THE MICRO USER NEWS

Acorn 512 upgrade prices are slashed

EDUCATION MICRO USER

Modems in schools: The roles they fulfil

BUSINESS MICRO USER

Essential guidelines for minimal systems

Project Domesday

The BBC Micro puts Britain on video disc

3 FULL LENGTH UTILITIES:

- *ADFS menu*
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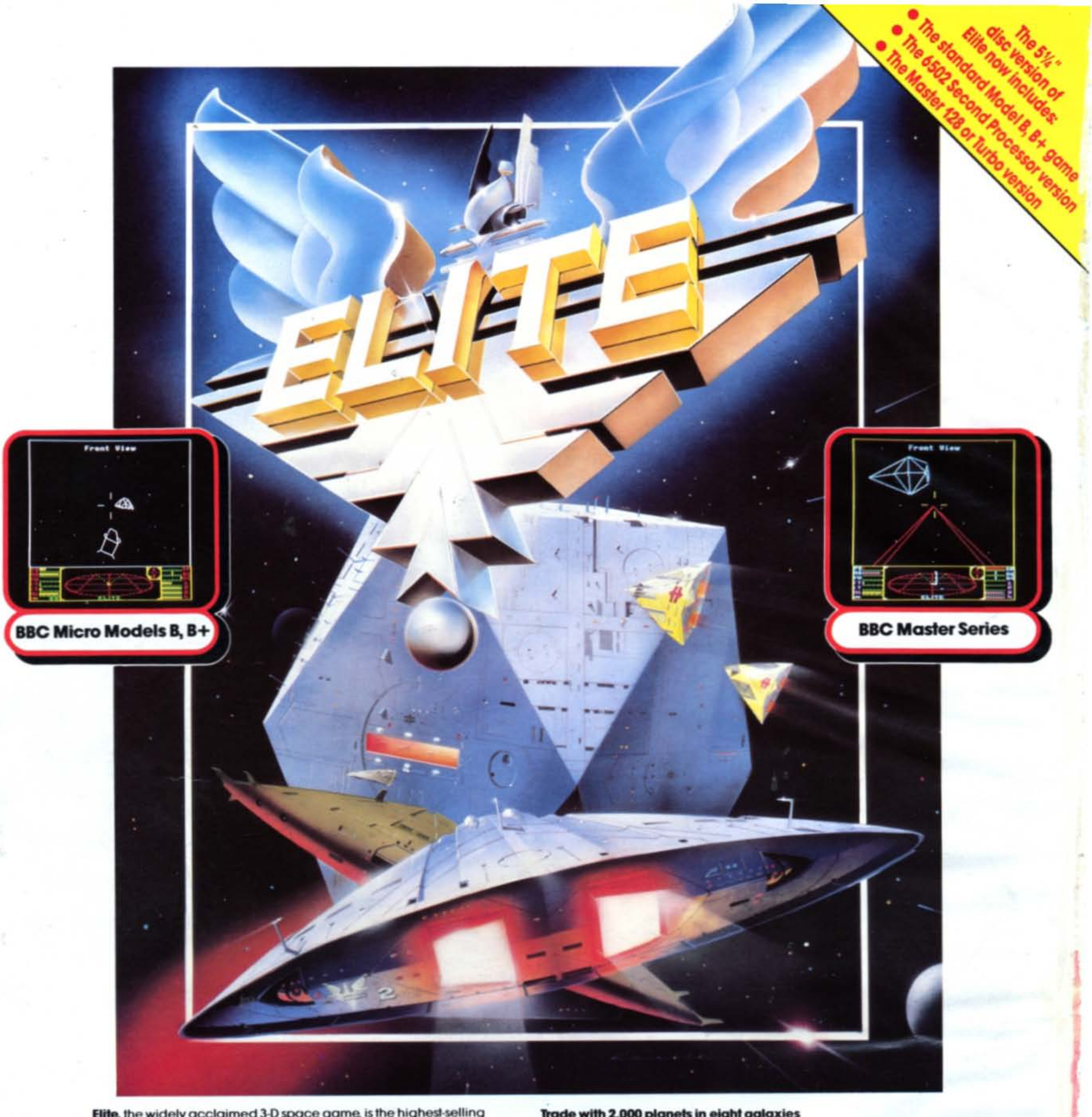
- *Disassembler*

Play AYO – the game of Africa

REVIEWS: Interword • MAX • Picture Craft • ADE Plus • Cluedo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Front View
BBC Master Series

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Tel: 061-456 8835 (Editorial)
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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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FEATURES

7 News

All the latest happenings in the ever changing world of your BBC Micro.

32 Domesday Returns

The project that's put the nation onto video disc: And its all been acheived using a BBC Micro.

43 Begin Here

More on using READ and DATA and some of the pitfalls that may trip the unwary novice.

46 6502 Games

Getting the best out of your micro with some essential routines for machine code games programmers.

49 Machine Code

You can take it from here as we investigate subtraction and further use of the Carry flag.

56 Adventures

More advice for the novice and seasoned adventurer alike – and help with Enthar Seven.

98 Body Building

Yet another thumping great idea from our electronics wizard – your own BBC Micro drumkit.

138 MicroLink News

A monthly progress report on the growth of Britain's nationwide online database for micros.

147 Tournament Sort

How do you sort disc files too large for your micro's memory? You'll find the answer here.

150 Tweetie

This short demonstration program illustrates some of your micro's superb graphics capabilities.

161 Micromail

The part of the magazine you write yourselves – your news, views, brainwaves and moans.

GAME OF THE MONTH

62 Ayo

This superb simulation of Mancala, the original game of Africa, needs strategy and foresight.

AYO
THE GAME OF AFRICA
INSTRUCTIONS COMPUTER DESIGN START-AGAIN

UTILITIES

40 Function keys

A useful routine allowing you access to 16 function keys while retaining full cursor editing.

53 Disassembler

With this superb program you'll be able to handle all 6502 and CMOS 65C02 instructions.

ADFS
Menu
Basic bouillon
* * *
Bytes Bourguignonne
* * *
And a sweet way round your hierarchical filing system

58 ADFS Menu

Step your way quickly through the hierarchical menu system with our easy-to-use utility.

BUSINESS MICRO USER

115 Minimal System

Getting your business setup right from the start: We've some helpful guidelines from our expert.

118 Application

How the BBC Micro has become a mine of information for visitors to many Welsh Tourist Board offices.

120 Inter-Word

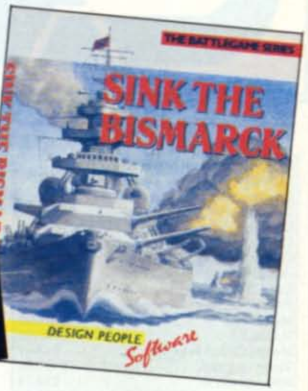
We evaluate Computer Concepts' new word processor – the latest addition to their Inter-Link series.

129 Spreadsheets

Altering the screen display is much easier than it may first appear. It's all a matter of justification.

REVIEWS

MICRO POWER
MAGIC
10 Original Hits


THE BATTLEGAME SERIES
SINK THE BISMARCK
DESIGN PEOPLE
Software

19 Software Scene

From Cluedo to Chart Challenge, Future Shock to Computer Hits 3 – the latest software is reviewed here.

38 Hardware

An easy to use applications board from Plymouth Open Learning is thoroughly evaluated.

93 Rom Roundup

Max from Advanced Memory Systems and ADE Plus from System Software are put through their paces.

EDUCATION MICRO USER

67 DTI Modems

Some expert opinion about the practical uses of modems in an educational environment.

71 Flying Fingers

Have fun and put your keyboard ability to the test in this fast arcade style typing tester.

77 Software

Our experts cast a critical eye over some of the latest educational releases for the BBC Micro.

81 Letters

A selection from our mailbag reflecting your views on the BBC Micro's role in education.

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THE MICRO USER

January 1987

NEWS

Acorn challenge to Amstrad in business market

ACORN has made its first move in a campaign to ensure that Amstrad does not have it all its own way in the small business market.

It has slashed the price of the 512k add-on board by £200 to make the Master far more competitive in this sector.

Now offered at £199, the company believes it will sway existing users from opting to buy a cheap clone.

For the board also provides Dos Plus which Acorn insists will translate into up to 70 per cent PC compatibility for the Master 128.

"And that means it will offer the best of all worlds", says Michael Page, Acorn's new spokesman.

"Just think what it will mean to the end users when generic business packages are added to the wealth of education and entertainment software currently available".

Equipped with the 512k add-on board, the Master will now be capable of running critically acclaimed packages such as Superbase 3 and dBase II.

However, problems will arise where there is a particular hardware requirement demanded by a program.

"This means if the software is looking for a specific chip on the IBM then it won't run on the Master – add-on board or not", says Michael Page.

A rule of thumb guide is that the machine with 512k will run virtually all PC text based programs, but not all graphics oriented ones.

This will present some odd complications at times, such as in the case of MicroSoft's Word.

For although this package runs under Dos Plus without a hitch, once a mouse is added it fails to come up with the goods.

"It simply starts looking for hardware that doesn't exist", says Michael.

"But all in all, the 70 per cent compatibiity rate means you can convert your Master into a very effective business machine for less than £200".

Footnote: Schools buying the 512k add-on board will be eligible to claim back £23 under the DTI Software in Schools scheme.

Rom has the last word

A SPELL checker with a 50,000 word vocabulary – the average human only has command of 10,000 – held in rom is due out "any day now" from Computer Concepts.

The prototype of Spell which appeared at the November Electron and BBC Micro User Show is unlike any seen before for the BBC Micro or Master.

For it has the ability to check text as it is input at the keyboard, even inside wordprocessor text files.

A 128k product, it occupies a single 16k socket on the BBC Micro, using a special system to switch invisibly between eight 16k images.

Spell is extremely fast – the prototype could check at the rate of 9,000 words per minute.

£1 MILLION SHOW BONANZA

A MILLION pound plus spend by visitors to the November Electron and BBC Micro User Show provided the biggest ever cash sales bonanza for the event.

The opening day set the trend when all previous attendance figures were broken as visitors took part in a mass pre-Christmas shopping spree.

Exhibitor after exhibitor rushed to report demand at an all-time high as they were confronted by people eager to part with their money.

"When the doors opened, you would have thought they were rushing in to take advantage of Harrod's sale", reported John Huddlestone, head of Advanced Computer Products.

"They've come to look on this event as providing real bargains – and they obviously weren't disappointed".

In all, there were almost 1,000 special offers available during the course of the three day event.

One customer alone – Peter Walker, an office manager from Caterham, Surrey – spent in excess of £1,000 during a four hour visit on the Friday.

"I suppose you can say I'm a dedicated BBC Micro user", he said. "After all, I've never missed one of the shows.

"To be quite honest you can't afford to these days with the bargains on offer.

"Let's just say I filled my Christmas stocking several times over and I reckoned I've saved as much again as the money I actually spent".

Once again people travelled from all over the country to attend the show.

And there was even the occasional foreigner to be found in the crowds thronging the New Horticultural Hall.

Doctor Michel Jourdois and his wife Marie-Chantal left their Paris home at 4am to get to the show for midday armed with a shopping list.

"I bought a BBC

→

3½" 'COMPACT' versions of CJE software available £2 extra.

CJE micro's

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After initialising Multi-Font NLQ with a '*MFNLQ', Multi-Font NLQ is normally transparent to the user. Multi-Font does claim some memory for workspace and storing font data.
Multi-Font NLQ comprises of MFNLQ ROM for the BBC, and utility disc containing the FONT definer, ten fonts, BASIC demonstration program, VIEW demo text file and Driver.
Multi-Font NLQ is compatible with nearly all software, including most BASIC programs, VIEW, WORDWISE & InterWORD (SCRIBE & Printer Buffer software currently not supported).

Ten fonts are supplied or create your own using the font definer supplied.
Fonts included are:-
Standard NLQ, Courier, Italic, Gothic, CompTS, Bold, Shadow, Outline, Broadway E, Theatre
Additional Font Disc MF 'B' contains:-
Hand, Script, Stencil, Broadway, Caps, Italic-Plain, Meccano, Plain, STD large, Wire, Greek/Maths and Inverse.
For Canon & Taxan Kaga users we recommend FONTAID in preference to Multi-Font NLQ.

Multi-Font NLQ (ROM and 40/80 Disc)	**£30.00**
Additional font disc 'MF-B' (12 fonts)	**£15.00**
Additional font disc 'MF-C' (15 fonts)	**£15.00**
P & P on MFNLQ	**£ 1.00**

NEW

MASTER Write Protect and ROM select switch.
Two switches set to RAM slots to be:-
Internal ROM or RAM Read and Write or RAM Read only.
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This is Standard
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This is GOTHIC
This is COMPTS
This is BOLD
This is SHADOW
This is OUTLINE
This is BROADWAY
This is THEATRE

EXAMPLE OF MFNLQ FONTS

FONTAID

NLQ Definer for Canon & Taxan Kaga NLQ Printers.

Design your own NLQ Fonts or 'download' one of our 40+ predefined fonts.

Fonts can be downloaded within Wordwise, Inter Word or VIEW Documents allowing different fonts to be used for different paragraphs, or even individual lines of text. During downloading your Program or Text will not be corrupted.

On the FONTAID standard font Disk are the following eight fonts:- Square, Outline, Italic, Gothic, Computer Type Style, Bold, Shadow, and Broadway Engraved.

Additional disc 'A' gives an extra 11 fonts including:-
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue '*' commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

FONTAID ROM & STD Font disc	(40 or 80 track)	**£30.00**
FONTAID ROM & STD Font disc with 6264 RAM	(40 or 80 track)	**£36.00**
FONTAID Additional Font DISC 'A' (11 fonts)	(40 Or 80 track)	**£15.00**
FONTAID Additional Font DISC 'B' (13 fonts)	(40 or 80 track)	**£15.00**
FONTAID Additional Font DISC 'C' (15 fonts)	(40 or 80 track)	**£15.00**
FONT ROMS of individual fonts are available eg "Square".		**£18.00**
P & P on FONTAID		**£ 1.00**

INFORM

A UNIQUE NEW POWERFUL USE FOR SIDEWAYS RAM

NEW

INFORM has been developed specifically to take full advantage of the Sideways RAM facility that many BBC micro users now have. Inform is compatible with most SIDEWAYS RAM units including ATPL Sidewise with RAM, Solidisc SWR, BBC B PLUS 128K & BBC MASTER series (not SDL256).

INFORM is a very powerful facility, which allows the user to display text information, of any kind, from Sideways RAM. This information can be readily accessed by using '*' commands from the keyboard or from application programs. In this way, much information can be displayed on the screen without stopping the current task, such as entering text in WORDWISE or VIEW.

The information in the RAM can be changed dynamically at any time.

Some of the possible applications for INFORM are: –

An on screen help manual can be created for your application, so that a reminder about more obscure points can be displayed at the users request. Information on your program or datafile contents, can remind you of their purpose.

Address and/or telephone numbers can be held and displayed quickly even while other applications are running. Very useful if you need to quickly display information about a client while he is hanging on the end of a phone!

Current prices for your products or stock position can be recalled instantly and readily modified using a wordprocessor. Similar files may be created from most databases such as VIEWSTORE.

In fact, any information to which you frequently refer can be displayed immediately without running another program. Your use of INFORM is only limited by your imagination, as they say!
There are three Inform Data Files (I.D.F.), of often used information, supplied on the disk to give an indication of the use of INFORM.

To use INFORM you must have Sideways RAM.

INFORM on 40/80 track disc. P & P on INFORM £1.00 **£20.00**

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Juki 6100 Daisywheel	**£280.00**
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C.J.E. BBC Printer Packs are £15.00 cassette (£16.00 disc)
(e.g. Kaga KP810 with Printer pack £260 + £15 = £275 everything included)

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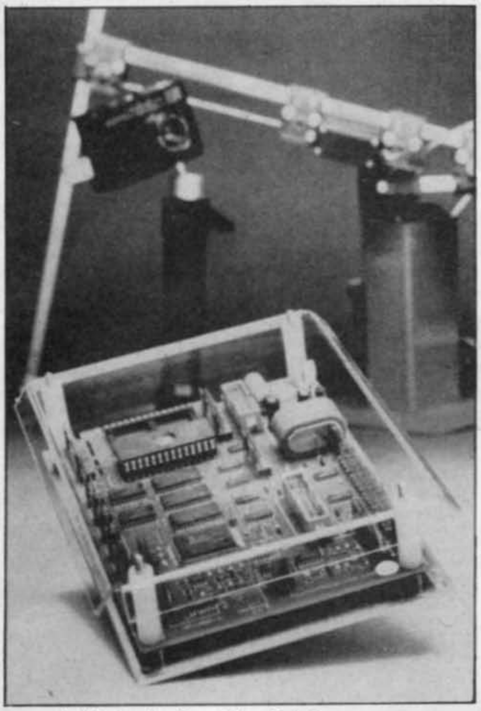

Accurate data logging from Micro-Robotics

Route to robotics

AN intelligent controller board for the BBC Micro is now on offer from Micro-Robotics.

And it's designed for people who want to get to grips with control technology, robotics and automation.

The Scorpion can be programmed by the computer and will then operate totally independently of it.

Possible applications include education, science and industry.

Events can be monitored and the results stored for printing and processing.

An electronic clock/calendar keeps track of time and date even when the power is off.

So the Scorpion will continue accurately logging data, day after day.

For accurate measurement there is also a millisecond clock. Price: £249.

Micros aid pilots

PILOTS who own a BBC Micro or Master can now spend more time flying and less on doing paperwork thanks to Flight Plan II from Paean Systems.

It makes complicated manual pre-flight calculations with a slide rule a thing of the past, achieving the same results in a fraction of the time.

Instead of poring over a map with a ruler the pilot can enter waypoints – easily identifiable turning points on the ground – as a series of internationally recognised codes for airfields or radio beacons, or as simple latitude/longitude coordinates.

After entering the flight data the pilot has only a second or two to wait before the computer provides all the information needed, from magnetic heading to steer and flying time for each sector to the total fuel consumption for the route.

The program is written by a pilot and comes with a database of airfield and radio beacon locations in Britain.

When used in conjunction with a printer, Flight Plan II produces a hard copy for use in the aircraft, complete with frequencies for the radio beacons to be used. Price £35.

68000 board upgrade

THE OS-9 68000 upgrade board from Cumana for the BBC B has been further enhanced with the addition of a robust plinth to house the system.

mounted mains sockets, a single illuminated mains on/off switch, and a fan for ensuring good ventilation.

The system provides a further 512k of ram, Winchester and floppy interfacing, real-time clock and £3,000 worth of software, price £795.

Full technical support is provided by the project management company – Seed Computers.

SOFT AS WOOL WARE..

MEN are rushing to buy a new BBC Micro software package . . . for their wives.

For Doreen Davies, a graduate of the Royal College of Art, has devised a program for knitters.

"We found there was a gap in the market for this kind of software", said Doreen.

"But we never expected it to take off quite so quickly."

Knitting Softwear prints a number of patterns for both machine and hand knitters and allows users to design their own knitwear.

However, the possibilities do not end with the knitting needle, as Doreen explained.

"Knitting Softwear allows you to create three-colour designs for fabric or any other surface.

"You can even design Christmas cards, or a pattern for a carpet."

Doreen moved into the design business after a variety of careers including jazz singing, acting, and journalism.

Today she is managing director of Newsight Ltd, which produces the software package.

A £90,000 grant for the knitting program was awarded by the Department of Trade and Industry, as part of its drive for software which will encourage women to make more use of computers.

Super Show

From Page 7

Micro a few years ago after seeing one while I was working in Germany", he told *The Micro User*.

Now the Jourdois boast two BBC Micros at home and the whole family – including their two children aged seven and five – use them.

Doctor Jourdois believes in all there are only about 20 BBC Micros in the whole of France.

So how does he keep in touch with what's happening and how did he learn about the show?

"That's easy", he said. "I'm a subscriber to *The Micro User*".

Three years ago

ANOTHER look back at what The Micro User covered just 36 months ago. This was the issue for January, 1984:

Acorn has made a major breakthrough in the campaign to secure a foothold in the educational market in India – thanks to a little help from the Queen. For following a regal gift of five of the company's micro networks to the President of India, Acorn has announced "a substantial order" for the sub-continent. Meanwhile from China comes the news that the BBC Micro's Econet network is coming under Oriental scrutiny.

* * *

Two of Acornsoft's latest releases – I Do and The Dating Game – have come under fire for being sexist.

* * *

Since its launch in September, the BBC Telesoftware Service has been inundated with praise from enthusiastic users. "We expected a lot of feedback from schools", says Lawson Brown, head of Telesoftware. "But what's taken us by surprise is the number of letters we've had from the general public".

* * *

The BBC Model B is to be the basis of a new computerised information service to be launched in the New Year by brokers Scrimgeour, Kemp-Gee. Already the largest supplier of information to the Stock Exchange's Topic service, the firm has spent two years perfecting the system called Dog Fox. It uses BBC Micros as terminals linked to the company's mainframe data bank.

* * *

Hermann Hauser, joint managing director of Acorn, has been nominated for the RITA Personality of the Year Award.

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It's an education in itself to see how mates get together. It's usually on the basis of compatibility. The feeling that they can do more together than on their own. A basic understanding of the others needs.

All of which can be said about the teaming-up of the classy, intelligent V21/23 Schools Modem with the versatile DIALUP Educational software. A combination to create the strongest educational data-communications tool available today. A class relationship, designed for every classroom. Come and make friends — it'll be an education for you.

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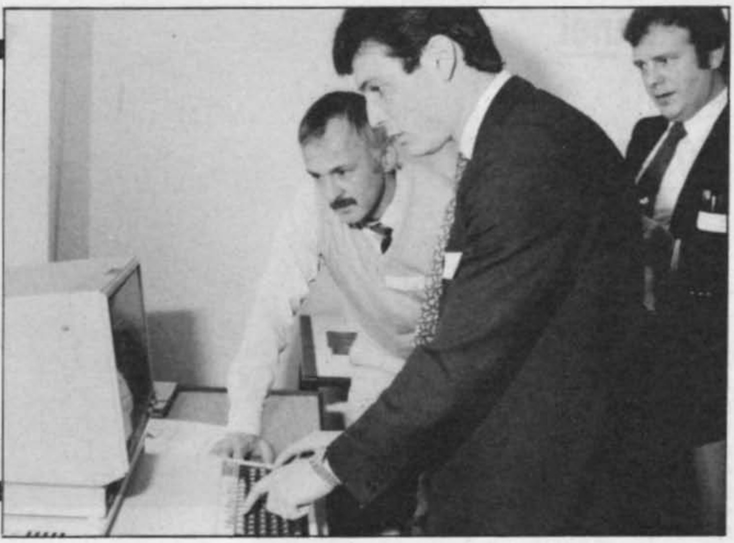
Software update from the MD

MICHAEL Hayward, managing director of Logotron, demonstrates his company's Pendown children's word processor at an open day for county council computer advisers. The event was one of three software update sessions for educationalists held at Logotron's Cambridge headquarters.

More than 80 advisers from all over the country saw demonstrations of Logotron's existing products for the 6 to 14 age group, and were also briefed on the firm's new mathematical modelling program Stella which is intended for higher education, research and desktop publishing.



Scores on tap

CLUBS, schools and associations running competitions and sports events can now operate a sophisticated scoreboard and results service on a BBC Micro.

Tournament Manager from Abico provides a full colour scoreboard, updated as each game or event is completed, with automatic movement of winners through each round.

There is a full display of tournament results and status, round by round, on demand with a print-out option.

The program can cope with up to 128 players, pairs or teams competing over seven rounds.

Games and rounds can be played in any order and there is automatic handling of byes.

The package comes complete on one 40 track disc and costs £9.75.

SHOPPING SPREE PEGS PRICE OF DISCS

A £1 million plus shopping spree in the Far East has resulted in the price of disc drives being pegged for the foreseeable future.

The news came only days after a warning that the cost of the peripherals was about "to go through the roof".

Now thanks to Nazir Jessa, the enterprising managing director of Watford Electronics, BBC Micro users will escape the overall market increase.

Realising that much of the problem stems from the strength of the Yen against the pound, the Watford boss headed for Japan.

There he was able to put together a deal which will guarantee there will be no significant price rises in the next few months.

And he also effected an immediate – if only slight – cost reduction for his customers.

And the reason why he was able to succeed where others have obviously failed?

"First of all I was in the position to order in sufficient quantity to ensure a good price", says Nazir.

"But more important was that I was able to persuade them to fix that price in sterling.

"So, for the time being at least, it will no longer be in danger of escalating with the Yen".

The trip to the Far East will bring other benefits for the Watford customers, according to Nazir Jessa.

For he took time out to obtain the exclusive rights to a number of peripherals which will be badged under his company's name.

The first – due to appear shortly – is a dot matrix printer.

"All the products due to be badged are of superb quality", insists the Watford boss.

"But most important of all for our customers is that we will be able to keep the price to the minimum by eliminating the middle men".

Micro pop quiz

A GAME for pop music buffs has been launched by Outlook Enterprises. Called Chart Challenge, the package incorporates four different programs.

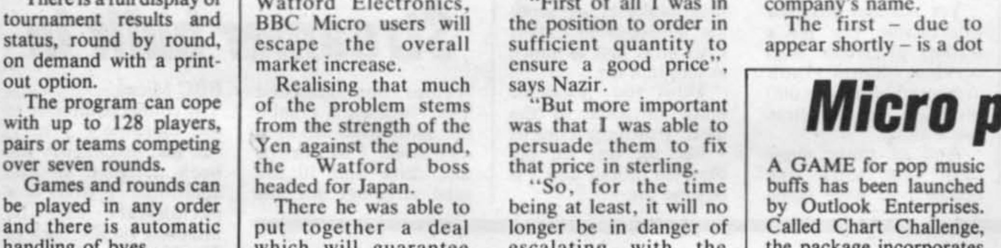
Trivia is a musical version of the popular board game Trivial Pursuits. Players are asked to select a category from one to 10, come up with an answer, then press a key to see if they are right.

Hangman displays a list of dashes corresponding to a well known song title. Letters are typed in until the correct title is given and then the player is asked to repeat this to find the group's name.

The third game is a quiz. Questions are selected from a wide variety of categories and the object is to score as many points as possible in 10 minutes.

Connections presents a numbered list of mismatched artists and song titles. You reunite the artist with the correct song to score as many points as possible.

Chart Challenge is available on disc and tape, price £19.95.



THIS new series of BBC compatible disc drives, approved by BEAB to BS415 for electrical safety has just been introduced by Cumana.

They are 5.25in, 3.5in and combined 5.25/3.5in.

The models available include CSX100 40 track single sided, £114.95, CS400S 40/80 switchable, £179.95, CD200 2 × 40 track single sided £279.95, and CD800S 2 × 40/80 track double sided, £339.95.

Transfer rate is 125/250k bps, settling time 15ms and rotational speed 300rpm. The 3.5in model is available in 1 x 80 track and 2 × 80 track. Storage capacities are 720k and 1.4Mb respectively formatted in double density mode.

Model CCD2000S, £324.50, combines the 5.25in and 3.5in drive systems for software development and transfer applications, the 5.25in drive being switchable to 40 track operation 1.4Mb formatted.

8 channel data logger

A NEW data logger for the BBC Micro, the Pearl 8000, has been produced by Massodax.

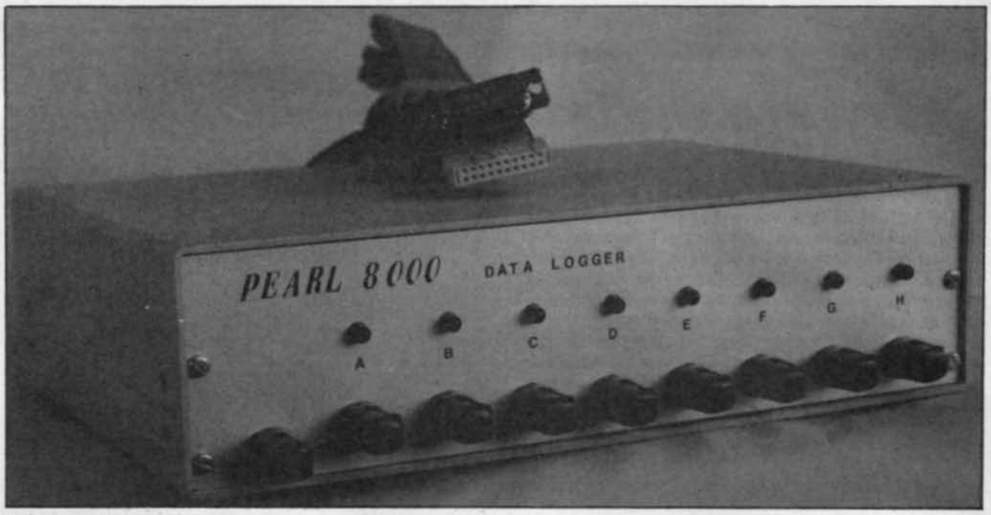
The instrument provides an eight channel multiplexed input to one of the four analog ports on the host computer, the other three inputs being brought out to an expansion connector on the rear. There are space outputs from the micro for future peripheral devices.

Inputs to the logger are via eight spring-loaded terminals on the front of the instrument plus a common earth terminal. These inputs are duplicated on the expansion socket on the rear for permanent fixtures and additional modules.

Selected

Full scale ranges of 1, 10, 100 and 250 volts DC – positive or negative – are automatically selected by one of the suite of programs provided on a 40/80 track 5.25in disc supplied with the unit.

The software provided includes complete basic programs plus modules intended for inclusion in the user's own software, which together will provide complete control over the mode of operation of the system. Price £150.



Pearl 800 data logger

Online Santa was a big attraction

FATHER Christmas's decision to go on-line for the festive season proved a major attraction for the kids – even for some obviously rather big ones.

What else could account for the electronic requests for Porsches, pay rises, Swedish au pairs and Page Three girls which flooded into the North Pole?

Yet another first for MicroLink, the UK's leading electronic mail service, Santa Link attracted some 1,000 messages in the first week alone.

And of these more than one third are believed to have come from adults.

Equipped with a BBC Micro no less, Santa electronically hooked himself up to the giant MicroLink central computer. Then all that was needed to contact him was any home or office micro.

"The response was quite incredible", says Derek Meakin, head of MicroLink. "It seems that adults enjoy sending messages to Father Christmas just as much as children do.

"Mind you, what he made of some of the more grown-up requests – like the one for the blow-up rubber doll – is beyond me . . ."

MEDALLION
GAC
ADVENTURE

WORLD sales of Graphic Adventure Creator from Incentive Software have just topped the £1 million mark.

As a result Incentive is awarding a Gold Medallion award to the best GAC-generated adventures.

The first two released under the new label are Apache Gold and Winter Wonderland. Price £7.95 each.

Streamer built in

Akhter has launched The Nucleus, a combination of 20/40 Mb hard disc drive, 1 Mb floppy disc drive and 10 Mb tape streamer for the BBC Micro.

It connects directly to the machine's 1 MHz bus and its circuitry has been designed so that additional 1 MHz bus peripherals can be attached via the back of The Nucleus, giving the BBC Micro full control over them.

Two versions are available. Nucleus 20 with a 20 Mb Winchester, price £1,391.26, and Nucleus 40 with 40 Mb Winchester at a cost of £1,735,61.

The 10 Mb tape streamer, which is designed principally to back up the Winchester, can either make an identical copy of the entire contents on the hard disc, back up a directory or back up a single file as required.

The 1 Mb 5.25 DS disc drive is switchable between 40 and 80 tracks and uses an ADFS to off-load data on to hard disc.

Back to nature – with a micro

ONE of the most unusual BBC Micro enthusiasts is Dutch-born graphic artist Jean Mourik.

He lives deep in the Welsh countryside in a house with no mains electricity.

Naturally this poses some problems when Jean wants to pursue his keen interest in computer graphics.

But the resourceful Dutchman is managing to cope with the aid of a small generator while waiting for someone to devise a method of running a BBC Micro off a car battery.

Jean told *The Micro User:* "I came to live in Wales three years ago because there is lots of space and nature here unlike Holland, and also because the UK has a lively breed of computer buffs of all sorts.

"I got involved in computing about five years ago and later on I got interested in 3D graphics mainly.

"I know something about raytracing and everything about hidden surface removal and matrix math.

"Optical disc memory and transputers interests me because graphics is my main subject and also speed is an important issue.

"I use the BBC Micro working on a generator with a 240V output because to become connected to the mains is too expensive, mainly through the need of a big transformer.

"But a generator working for a computer and monitor is very inefficient in power and noisy.

"This why my ambition is to work the computer from a 12V car battery so I can use the current for the disc drive and special monitor straight away.

"If any readers of *The Micro User* could tell me how to change +12V into +5V without using a resistor, and still be able to switch back to 240V, it would be the perfect solution.

"Then I could still fulfill my love of the countryside while enjoying all the benefits of BBC Micro technology".

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The Opus double density disc interface is already a best-seller and it's suitable for use with both 40 and 80 track drives, single or double-sided. It's even compatible with the Master and Master Compact computers. You'll gain an immediate 80% increase in data storage capacity over the standard Acorn DFS and, because our DDOS plugs directly into your micro, there are no complicated interface connections to worry about. You can leave your DFS in place, guaranteeing 100% compatibility.

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Firebug (disc)	11.50	10.45
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Snooker (disc)	11.50	10.50
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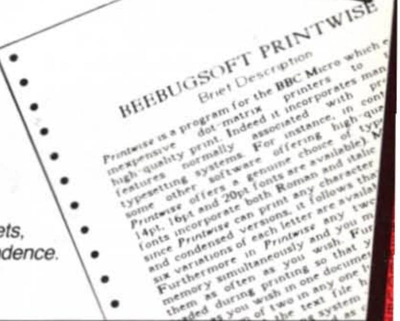
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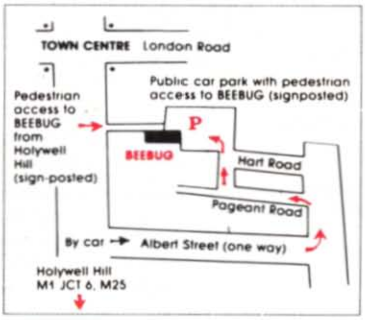
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1102A	Wordwise	28.75	27.31
1103B	C.C. Graphics ROM	24.73	23.49
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1105B	Printmaster (Star)	28.00	26.60
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1109B	Disc Doctor	27.00	25.65
1110B	Intersheet	44.85	42.61
1111A	Hi Intersheet Disc	5.75	5.46
1112A	Hi Wordwise+ Disc	5.75	5.46
1113B	Caretaker Rom	28.75	27.31
1114B	Interchart	29.90	28.41
1115B	Speech System TTS	30.99	29.44
1117B	Interword	50.03	47.52

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Code	Description	Price	Mem Price
1000B	Acornsoft View	44.28	42.06
1022C	View 3.0 Rom	66.70	63.36
1002B	Acornsoft Hi-View	44.28	42.06
1013B	View Print/Drive T.	8.62	8.19
1014B	View Print/Drive Disc	9.77	9.29
1043B	Acorn Viewspell Rom	34.02	32.32
1021A	Acorn Viewindex Disc	14.37	13.66
1019B	Acorns Viewstore Rom	44.28	42.06
1030B	Acornsoft ViewPlot	25.30	24.03
1001B	Acornsoft View Sheet	44.28	42.06
0243A	Master Lisp C.ROM	59.69	56.70
1003A	Acornsoft Lisp Rom	41.40	39.33
1025B	Acornsoft Lisp Cass	10.35	9.83
1041B	Acornsoft Forth Rom	38.53	36.60
1042B	Acornsoft Forth Disc	19.00	18.05
1027C	Micro PROLOG	74.75	71.01
1033B	Microtext Disc	55.20	52.44
1034C	Microtext Plus Rom	240.00	228.00
1035B	6502 Dev. Pack	45.00	42.75
1004B	Acornsoft BCPL	50.03	47.52
1026B	BCPL Generator	43.57	41.39
1005B	Acornsoft Comal	41.97	39.88
1006B	Acornsoft Logo	50.71	48.18
0244A	Master PASCAL C.ROM	67.85	64.46
1007C	Acornsoft ISO Pascal	50.71	48.18
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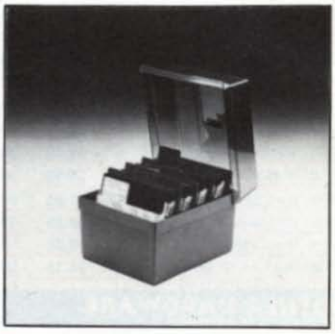

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0703B	AMX Mouse	74.75	71.01

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1173A	Mini Office II 40T	16.50	15.68
1174A	Mini Office II 80T	16.50	15.68
1175A	Clares Replica III	15.00	14.25
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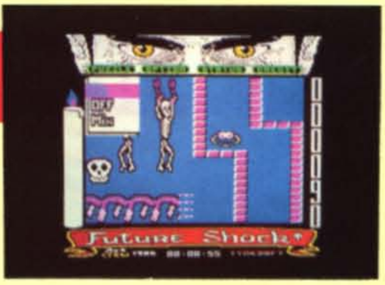
Future looks bright



Program: Future Shock
Price: £7.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon-upon-Tyne, Tyne & Wear NE21 4TE.
Tel: 091-414 4611

EVEN the Supreme Being gets weary at times when it comes to the job of creation. It was on one such occasion that he decided to subcontract the job to a bunch of cowboys from the Galactic Corporation.

Following a night on the town they awoke to discover that they had lost the scroll of evolution – the blueprint for the human race.

You play the role of Glob the blob, a large squat ball with big eyes and a mouth. He has been chosen to locate the 16 pieces of the scroll and reassemble them.

Future Shock uses a novel screen design. At the top are the eyes of the all-seeing supreme being and below is a large graphic window in which the action takes place. At the sides are a score board and a large candle.

A slowly burning candle is used to depict Glob's life expectancy but the rate of burn increases dramatically if Glob comes into contact with any alien beings.

Glob's lifespan can be increased by collecting the power pills to be found on several of the screens. It wasn't until I'd played the game for some time that I realised these pills were also the segments of scroll for which I was searching.

You can examine the pieces of scroll you collect by using a pull-down menu. Key number one displays a menu which lets you manipulate the puzzle pieces.

Controls are limited to left and right movement, but you can travel up or down by using the lifts found on most of the screens, or by falling off a ledge.

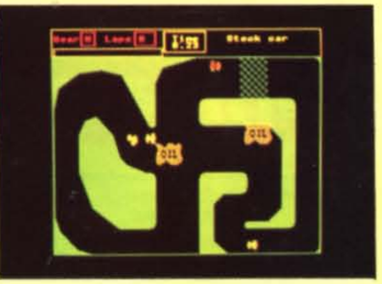
An anti-gravity shaft runs through the centre of the maze and, while floating up through the shaft, you can drift to the left of right.

Future Shock is an excellent program, a game which overflows with character and humour.

Carol Barrow

Sound	*8*
Graphics	*9*
Playability	*9*
Value for money	*9*
Overall	*9*

Golden Oldies



Program: Micro Power Magic
Price: £7.95 (cassette or disc)
Supplier: Micro Power, Northwood House, North Street, Leeds LS7 2AA.
Tel: 0532 458800

THIS collection of 10 golden oldies from Micro Power has been put together just in time for Christmas.

In Killer Gorilla, Kong has kidnapped your beloved and carried her to the top of a scaffolding tower.

Climb the tower to rescue her but watch out for the barrels which the monster monkey throws your way.

In the graphical geography quiz Where, you must identify rivers, towns and peaks as they are highlighted on a map of the United Kingdom.

The first of the space games on offer is Martian Attack – defend your base while shooting the martian raiders.

This is a game in which a joystick is essential if you are to score more than a couple of thousand points.

Stock Car was one of the first games that I ever reviewed for *The Micro User*. A game for one or two players in which you power your way around one of six circuits. One of my old favourites.

Eldorado Gold is a simple adventure game written in Basic in which you search Eldorado county for Bill McClusky's treasure.

In Plutonium Plunder you are trapped in a maze with walls constructed from hexoid pods. Kill the mutant gnomes by crushing them with a pod.

Whatever you do don't take too long or you'll never live to regret it.

When I loaded up Barrage I expected the worst. Two opposing gun emplacements firing on each other across a cross sectional drawing of the terrain.

Enter values for trajectory, velocity and spread then watch the result – fantastic!

Dune Rider is set on the moon. Drive your moon buggy at high speed across the lunar landscape, jump over lava pools and rocks while blasting the aliens which swarm overhead – a fast and furious game.

Nemesis involves a convoy of aliens flying down the screen towards you. Every time they strike an asteroid they change direction.

The last offering in this compendium is Labyrinths of La Coshe, another adventure game. Unfortunately it is a pretty crude one which fails to understand much adventure language.

Micro Power Magic cannot be faulted when considered in terms of value for money, even if some of the titles are a little long in the tooth.

Steve Brook

Sound	*7*
Graphics	*8*
Playability	*8*
Value for money	*10*
Overall	*8*

A spellbinder!

Program: The Twin Orbs of Aalinor
Price: £3.95
Supplier: Potter Programs, 7 Warren Close, Sandhurst, Camberley, Surrey GU17 8JR.
Tel: 0252 877608

"THE first age of Aalinor saw the rising of Gorgoroth, Lord of the Underworld. In that time great evil was done to the fair works of Aalinor and its people."

The noble and wise Lord Geremot tried to harness the power of two magic orbs to defeat the evil, but he was defeated and sucked into a time vortex and the twin orbs were lost.

You must recover both orbs and fuse them to set free Lord Geremot and to ensure that the evil of Gorgoroth does not rise again.

Despite marvellous room descriptions and wise setting of puzzles the game is littered with spelling mistakes and simple grammatical errors: "The Carpenter works busilly" is a prime example.

However most of the location descriptions are atmospherically set and make the bones tingle: "A rotting corpse, writhing with maggots and covered in festering boils lies on the floor."

My mistake was in examining the corpse, for I soon discovered black boils erupting all over my skin and felt decidedly poorly. The computer informed me I had died of the dreaded lurgy and was now an ex-adventurer!

I later found myself "hanging on the clapper of a huge iron bell, which is crusted with the sulphurous deposits from the smokes that rise from below."

I was surprised that I couldn't Take and Search and the failure to condense SOUTH to S was most

annoying – these are surely things which Potter could put right.

Nevertheless this is an adventure which I would happily slot into my Top Ten, though Potter has some way to go before it seriously challenges the quality of Robico, Shards or Epic.

Pendragon

Presentation	*3*
Atmosphere	*9*
Frustration Factor	*7*
Value for money	*9*
Overall	*8*

Bismarck won't sink

Program: Sink the Bismarck
Price: £10.99 (disc only)
Supplier: Design People Software, 77 Grimwade Street, Ipswich, Suffolk IP4 1LN.
Tel: 0473 52555

THE German battleship Bismark was one of the most formidable fighting machines ever built. Currently on the loose somewhere in the Atlantic Ocean she is free to prey on the British convoys. It is imperative that you Sink the Bismark.

The main playing area is a map of the mid-Atlantic and the European coastline. On the map are 11 ship symbols which represent your forces and several circles which represent the convoys to be protected.

A small swastika on the screen shows the last reported sighting of the Bismarck, but not necessarily its present position.

Using a cursor you select the vessel you wish to control. You may alter its speed and direction and it will then hold this course until told otherwise.

The game contains three types of action sequence, crude by arcade game standards but quite adequate for this type of war game simulation.

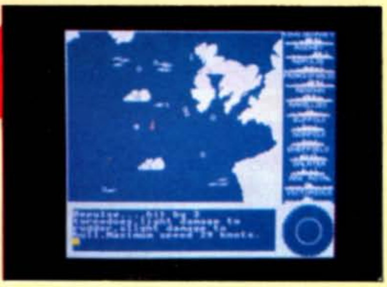
In the first you are under attack from German U-boats. The computer displays a slice through the Atlantic. On the surface is the battleship under threat along with your destroyer.

Below the surface is the U-boat which moves at a constant speed across the screen. Controlling the movement of the destroyer you set depth charges for the correct depth and drop them, hoping they will explode in the path of the U-boat.

The second type of encounter occurs when the Bismarck meets any vessel other than an aircraft carrier. Below the damage ratings of the two vessels are small silhouettes representing the two ships.

You control the elevation of your guns and may move towards or away from the Bismarck in an attempt to hit it.

Finally we have the encounter



between one of your two aircraft carriers and the Bismarck. This time you control the vertical movement of a small plane as it flies between the two silhouettes.

Half way to the target you will encounter the incredible anti-aircraft fire of the Bismarck. I considered myself lucky if I got one in five planes close enough to release a torpedo.

Sink the Bismarck has the perfect balance between pure strategy and an arcade game.

James Riddell

Sound	*7*
Graphics	*7*
Playability	*9*
Value for money	*9*
Overall	*8*

All clued-up

Program: Cluedo
Price: £12.95 (cassette)
Supplier: Leisure Genius, c/o Virgin, 2-4 Vernon Yard, Portobello Road, London W11 2DX.
Tel: 01-727 8070

DOCTOR Black was dead – that was the only thing I could be certain of. Was it Colonel Mustard with the revolver or Professor Plum with the rope? Such are the decisions in the computer version of Cluedo.

The game is for up to six players and any number can be computer controlled.

The murder inquiry involves six suspects, six weapons and nine rooms in which the murder could have taken place.

In the board game this information is held on small cards and one card is taken from each of the three groups before the game starts. The rest of the cards are then shuffled and dealt between the players. In the computer version the cards are dispensed with and the program keeps track of this information.

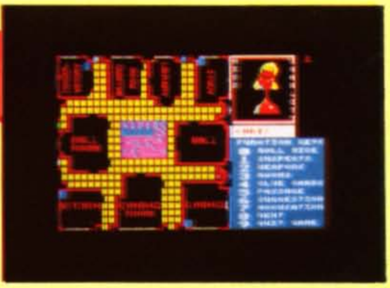
The objective is to deduce which three cards are missing thereby identifying the murderer, weapon and location.

Two thirds of the screen is occupied by a colourful and detailed representation of the playing board.

To the right of this is a picture of the current player and a reminder of the commands which have been assigned to the function keys. These control the major operations in the game.

The suggestion key is the most frequently used option. Once each turn you are allowed to suggest a combination of suspect, weapon and room.

The other players are then asked in turn whether they have one of the cards, in which case they must reveal it to you, allowing you to eliminate it from your inquiry.



You continue in this way until you are sure who dunnit, with which implement and where.

At this point you may press the accusation key, but if you are wrong then you are out of the game.

Cluedo is every bit as good as the original board game.

Steve Brook

Sound	*4*
Graphics	*9*
Playability	*9*
Value for money	*8*
Overall	*8*

Too little, too late

Program: Crystal Castles
Price: £9.99 (cassette) £14.99 (disc)
Supplier: US Gold, Unit 2&3 Holford Way, Holford, Birmingham B6 7AX.
Tel: 021-356 3388

THE original Crystal Castles was an Atari arcade game. Now this Pacman variant has found its way on to the BBC Micro – about two years too late.

Pacman – as you will remember – was designed around a maze in which the pathways were covered with dots. Crystal Castles uses this same idea but divides the maze into squares.

These are then raised up to create ramps and towers. Some of the taller towers can only be reached using lifts, others have tunnels running beneath them.

Controlling a small character who looks a little like the devil, you run round the maze collecting the dots, or rather gems. Clear the maze of gems and you move on to the next.

Life is made difficult by the presence of an entourage of evil characters.

The first of these are the red balls. There are only two on the first screen but they are quite cunning in the way they lure you into corners.

Screen two sees the arrival of the trees which operate in the same way as the balls but in greater numbers.

Other nasties include gem guzzling caterpillars, a skeleton and a wicked witch.

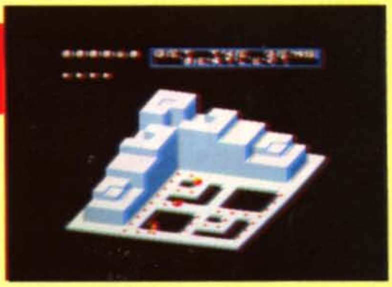
Dawdle for too long on any screen and a whirlwind appears from on high just to add to your problems.

On the plus side there is the wizard's hat – collecting this will provide you with temporary immunity against the effects of all nasties.

Having sped through the first six screens I was asked whether I wished to load a new set of castles.

If you want to amass a huge score then reply no to this question – you will be returned to screen one and allowed to run through all six screens again with no increase in difficulty!

The three dimensional effect may have been clever two years ago but is nothing special now. The animation is smooth but some of the characters are poorly defined.



If you're feeling nostalgic and would like your own copy of Crystal Castles then be my guest.

On the other hand unless you want an old fashioned game that wouldn't keep the average termite amused for more than five minutes then stay well clear.

Jon Revis

Sound	*5*
Graphics	*7*
Playability	*5*
Value for money	*5*
Overall	*5*

Not many misses

Program: Computer Hits 3
Price: £9.95 (cassette)
Supplier: Beau Jolly, 29A Bell Street, Reigate, Surrey RH2 7AD.
Tel: 07372 22003

COMPUTER Hits 3 is a compilation of 10 previously released games for the BBC Micro. They are supplied on two cassettes and represent quite a bargain at £1 per program.

In Brian Jacks Superstar Challenge you compete against the might of Mr Jacks in a series of eight events.

Caesar the Cat uses some clever Mode 7 graphics but that's about all. Caesar chases mice around the larder in this tedious excuse for a game.

In Wallaby a troop of evil monkeys have kidnapped your baby. You make your way to the top of the ladders and levels style screen to rescue him.

Felix meets the Evil Weevils is one of my favourite Micro Power games. Felix must eradicate the factory's weevil population, while negotiating the conveyors and avoiding the ball bearings – great fun!

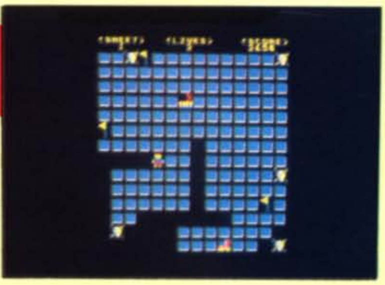
Mineshaft is a curious choice for this compilation as it is a second rate Manic Miner clone. The genuine article can be found on the second cassette.

Danger UXB is yet another of my favourite oldies. Run around a colourful grid defusing bombs before the time limit expires.

Moon Raider is a version of that arcade classic Scramble. Fly your space ship deep into the enemy cavern, bombing bases and fuel dumps.

Manic Miner was the classic ladders and levels game for the Sinclair Spectrum. Work your way through twenty tortuous screens collecting keys as you go. It's as enjoyable and challenging as ever.

Snooker is a fairly standard version of the game with options for one or two players.



Finally we have Battletank, a reasonable version of the arcade game Battlezone.

Drive your tank through a 3D landscape blasting enemy tanks before they blast you.

Computer Hits 3 contains the odd game of dubious quality but overall it is still excellent value for money.

Jon Revis

Sound	*7*
Graphics	*8*
Playability	*7*
Value for money	*9*
Overall	*8*

Must for the musical

Program: Chart Challenge
Price: £19.95 (cassette), £19.95 (40 track disc), £17.95 (80 track disc)
Supplier: Outlook Enterprises, 86 Glenmore, Clayton-le-Woods, Chorley PR6 7TB. Tel: 0772 34894

I AM a dedicated Trivial Pursuit player, so it was with eager fingers that I tore open the wrapping of this pop trivia game.

Chart Challenge may appear a mite pricey but you get a lot for your money – five cassettes, or up to five discs. Disc one contains the programs, while the others are reversible so you are supplied with the equivalent of eight single sided discs of data!

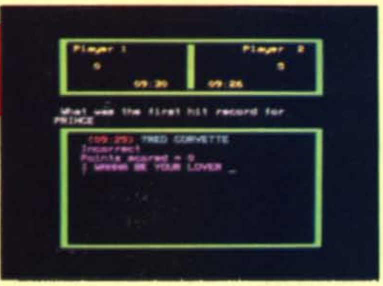
The first game is called Trivia, designed to replace the box of questions in a game of Trivial Pursuit. Before play commences you select five categories on which you wish to be questioned from a choice of ten – the sixth category is always pot luck. These are assigned a Trivial Pursuit board colour.

During play you select a colour using the cursor keys and the next question will be displayed. You are not required to type your answer, merely speak it out loud then pressing any key to display the correct answer and check if you are right.

Game number two is Hangman, the number of dashes corresponding to the letters of a song title are displayed on the screen. You must type in letters until you have guessed the title. This is repeated for the group's name.

Game number three is a straightforward quiz in which you must score as many points as possible in 10 minutes. Questions are selected from a wide variety of categories, and a help key provides clues if you are stuck.

Finally there is the connections game. A numbered list of mismatched artists and song titles is displayed and you have to reunite artist and song within a given time limit. You must then do the same with title and date, title and record label, and title and chart position.



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What was the first hit record for
PRINCE
(09:25) FRED CORVETTE
Incorrect
Points scored = 0
I WANNA BE YOUR LOVER _
```

I like to think that my musical knowledge is pretty good but I was stumped on numerous occasions. Chart Challenge is a must for the music buff.

Carol Barrow

Sound	*N/A*
Graphics	*5*
Playability	*9*
Value for money	*10*
Overall	*9*

MICRO MEDIA Computer Supplies

0707 52698 or 0707 50913

Dept. MU Rydal Mount, Baker Street,
Potters Bar, Herts EN6 2BP

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Mixed types for quantity breaks

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Walters WM80 M/S	3.80	3.00	2.80
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If the ribbon you require is not listed ring 0707 52698 and let us quote

Head Cleaners

Discs with 15ml cleaning solution

5¼" Head Cleaner	4.00
3½" Head Cleaner	5.00

Printer Leads

Centronics lead to connect BBC to Epson Kaga Canon etc.

1 MTR	6.30	2 MTR	8.50

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Adjustable hardback ring binder for 11x9½ to 12x9½ cont paper 40mm paper capacity

BLUE RED or BLACK	£4.90 each
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Disc Mailers

	Price each 50+	100+
Rigid Cardboard holds up to 3 discs	40p	28p

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for Monitors

Pan tilt revolves around 360° 12.5° tiltable up and down adjustable by front mechanism.

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14" Monitors	**£15.00**

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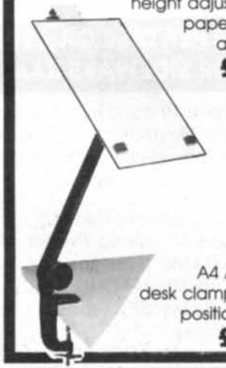
A4 Adjustable desk clamping. Magnifying cursor line paper height adjustable clip, paper thickness adjustment.

£19.80



A4 Adjustable desk clamping. Plate positioned 360°.

£13.90

Printer Stands

5mm clear perspex
405 x 325 x 100mm

80 column printers	£17.90
132 column printers	£24.90

Micro Media Brand Universal 5¼" Discs

Reversible with 2 notches and index holes. Lifetime guarantee, hub rings, envelopes, labels. Suitable for 40 or 80 track. Packed in plastic library case.

10+	30+	50+
9.40	**8.90**	**8.50**

Unbranded 5¼" Discs

Certified lifetime warranty hub rings, envelopes, labels

Prices per 10 Discs

	10+	**30+**	**50+**
SS/DD 40	6.50	6.00	5.50
DS/DD 40	7.50	7.00	6.50
DS/DD 80	8.50	8.00	7.50

Unbranded 3½" Discs

Lifetime Guarantee/label sets

SS/DD	17.00	16.00	15.00
DS/DD	19.00	18.00	17.00

3M 5¼" Lifetime Guarantee

SS/DD 40	10.80	10.40	10.00
DS/DD 40	12.80	12.40	12.00
DS/DD 80	17.70	17.00	16.50

3M 3½" Lifetime Guarantee

SS/DD	20.50	20.00	19.00
DS/DD	27.50	27.00	26.00

Verbatim Datalife 5¼"

SS/DD 40	11.70	11.40	11.10
DS/DD 40	14.70	14.,40	14.10
DS/DD 80	19.70	19.40	19.10

Computer Labels

Continuous fanfold, sprocket fed

Price per 1000	1,000	2,000
70 x 36	4.20	3.80
89 x 36	4.30	3.90
89 x 49	5.90	5.30
102 x 36	4.50	4.20

Please state no. of labels across the sheet (1, 2 or 3).

9½" Backing Sheet for Fixed Tractor

	1,000	2,000
70 x 36 3 across	4.20	3.80
89 x 36 2 across	6.60	6.30
102 x 36 2 across	6.70	6.40

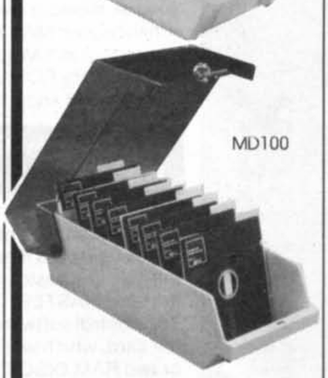
Computer paper

Plain fanfold, micro perf edges

Size	Weight gsm	1000's per box	Price per box 1 box	2 bxs+
11x9½	60	2	12.50	11.80
	80	2	15.50	14.20
EXACT A4				
11⅔x9¼	70	2	20.90	18.50
	90	1	13.20	11.00

A4 Fixed tractor paper available

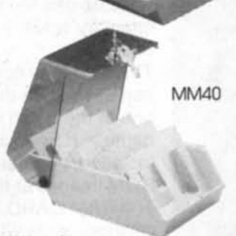
MM100
Lift off lid



MD100

MM50
Lift off lid

MD50



MM40

Disc Boxes

	1	3+
MM 100 5¼ x100	11.70	10.00
MD 100 5¼ x100	11.70	10.00
MM 50 5¼ x50	8.70	7.90
MD 50 5¼ x50	8.70	7.90
MM 40 3½ x40	8.50	7.40
Rexel Mini Disc Box	5.00	
Plastic Library Case	1.50	

All MM boxes anti-static with lock

● Educational and HMG orders accepted. ● Trade enquires. ● Personal callers welcome. ● Open Sat 10am - 4pm

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ADD-ONS FOR MASTER 128K

ONE MEGABYTE OF RAM ON A CARD

More and more software relies on the MASTER 64K Sideways RAM to run, forcing many of us to leave the two links L18 and L19 in RAM position and use only one ROM socket for our ROM software. Standard software cartridges are convenient but they have only 2 ROM sockets and frequent swapping may be necessary. Lastly, 64K is not enough to make an effective RAM DISC.

Solidisk memory cards can solve all those problems and enhance your MASTER still further. The RAM CARD can add up to 1 Megabyte of RAM, the ROM CARD has 4 high capacity ROM sockets and a switch to control the two links L18 and L19.

SOLIDISK MEGA-RAM CARD FOR THE MASTER:

Eight 1-Megabit RAM chips hold this Megabyte of memory and the entire system is completely contained on a single card measuring only 85mm × 95mm — half the size of a postcard — yet it has 8 times more RAM than the MASTER.

The control software is in a 16K ROM, also built-in on the card, which will turn this memory instantly into one or two RAM DISCS, or a printer buffer or simply 64 banks of Sideways RAMs which in turn may contain ROM images.

If you feel that One Megabyte may be too much, we have the same card fitted with 256K memory instead. This is still enough to give you in silicon the equivalent of an 80 track disc drive in DFS format (200K bytes) or 16 Sideways RAM banks. At only £100 inclusive of VAT, you pay less than 40p for each kilobyte. And when 1-Megabit RAM comes down in price, you may get it upgraded to One Megabyte later. We foresee Megabyte RAM cards priced as low as £200 towards MARCH 87 — that's less than 20p a kilobyte. So you see, cheap Megabyte MASTERS are just around the corner. The RAM CARD can be a printer buffer, freeing your computer and saving you time. It can be one or two RAM drives replacing physical floppy disc drives. RAM DISC is 10 times faster than physical drives and quiet as they do not have any moving parts. The RAM DISC can be 100K or 200K in DFS format and up to 640K in ADFS, with the one Megabyte card. The maximum RAM disc capacity is 17K less than either 256K or 1024K capacity of the card.

The card may hold ROM images. Up to 16 or 64 images can be held on the card and *LCAT will list them all. Any one of them can run at any time after *SELECT <ROM name>. If Solidisk MDFS 3.0 and/or MADFS 3.0 ROM is installed, you may have both RAM DISC and Sideways ROM images at the same time.

The RAM CARD is simply plugged into any of the two cartridge slots with the label facing you.

Price:

256K RAM CARD (Code R256) and manual	**£100**
Megabyte RAM CARD (Code R1024) and manual	**POA**

SOLIDISK ROM CARD AND T-SWITCH:

This simple card features 4 high capacity ROM sockets, accepting both 16K and 32K EPROMs. One socket can be made to accept a 32K byte static RAM chip (type 62256-15). To select a ROM (or RAM if installed), set a combination for the 2 mini DIP switches. A two position switch is also included to control external links L18 and L19 so that you do not have to open the case just to change the link position. The switch is fitted with proper connectors for easy and secure installation.

Price:

Basic ROM card with T-switch (code R104)	**£15.00**
Same with 32K static RAM fitted (Code R103)	**£27.00**

EPROM PROGRAMMERS AND ERASERS:

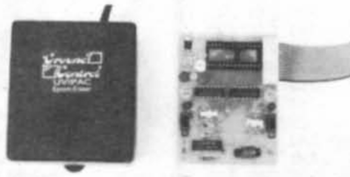
The UVIPROM can program 8K (2764) or 16K (27128) EPROMS from disc files. A software disc (40 track) is supplied and includes a powerful Machine Code Monitor and Disassembler (SOLIMON). A special version — UVIPROM 32-should be ordered to program exclusively 32K (27256) EPROMS.

The MULTIPROM is the DE-LUXE version of the basic design, capable of programming all types including 64K (26512/27513) EPROMS, cased and fitted with Textool Zero-Insertion-Force (ZIF) socket. The UVIPAC is an Eprom ERASER which can erase 3 EPROMS of any type in around 15-20 minutes.

Prices:

UVIPROM (Code U16) Eprom programmer for 8K and 16K	**£20.00**
UVIPROM-32 (Code U32) Eprom programmer for 32K	**£21.00**
MULTIPROM (Code UM) Eprom programmer for all types	**£44.50**
UVIPAC Eprom eraser for all Eproms	**£20.00**

Blank Eproms:
8K: £1 each, 16K: £3 each, 32K: £6 each, 64K: £12 each.

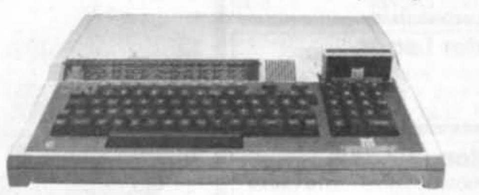


£3 PER DISC OR £10 BY 5 — SOFTWARE FOR SIDEWAYS RAM:

We have 10 discs full of software for the old Beeb which is now 'Masterised'. You can order any volume (M1 to M10) individually for £4 or by pack of 5 discs (MP1 or MP2) at £10.00 each.

Master Software Pack 1:
Volume M1: Menu, Printer, Index, Solimon, Uviprom.
Volume M2: Silexicon and Silexigen.
Volume M3: MACRO BASIC, Linker and Editor.
Volume M4: SFX (special effects) and Soliwin (a window manager).
Volume M5: ADFS 80 track-D/S, Solidisk Datafile Version 3.

Master Software Pack 2:
Volumes M6 to M10 contain around 50 computer games.



BEEB 256K PRICES:

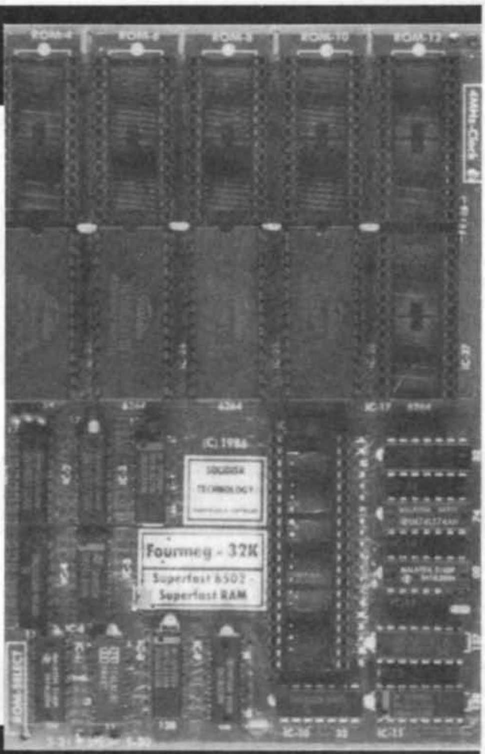
TWOMEG 256K, 16K Manager ROM	**£115.00**
TWOMEG 256K, with Wordwise Plus	**£145.00**
TWOMEG 256K, with InterWord	**£165.00**
FOURMEG 256K, with Wordwise Plus	**£165.00**
FOURMEG 256K, with Interword	**£185.00**
ROM board TRADE-IN discount	**£30.00**

COMPANY'S HOLIDAY:
WE WILL BE CLOSED BETWEEN 25TH DECEMBER TO 2ND JANUARY

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

SOLIDISK NEW DEVELOPMENTS

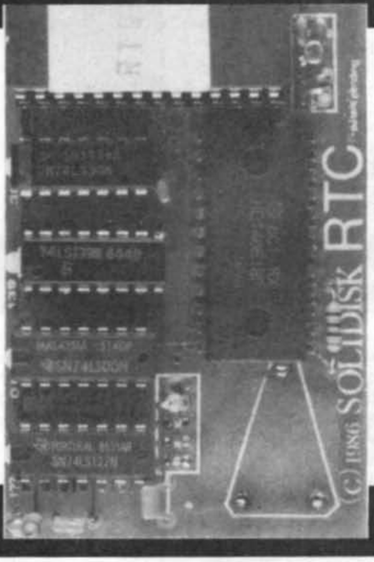
Shadow, Sideways ROM and Sideways RAM All-In-One for £50:



This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).
The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.
The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.
The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.
When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).
The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.
The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

TWOMEG-32K	£50.00
65C02 (2MHz) for the above	£10.00
Or upgrade to FOURMEG	£25.00
FOURMEG-32K	£70.00

Real Time Clock & Desk:



The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.
The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.
You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).
The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK	£29.00

THE SOLIDISK BOOKCASE

Title	Price
Programming the 6502	16.95
Advanced BASIC ROM for BBC	9.95
Advanced User Guide	15.95
BBC User Guide Binder	4.00
BCPL User Guide	15.00
Introduction to Comal	10.00
Logo Reference Manual	7.50
Termulator Manual	10.00
Lisp on the BBC Micro	10.00
View Guide	5.00
View 3 Manual	10.00
Viewsheet User Guide	10.00
Mastering Amstrad 8256 8512	8.95
dBASE III Advanced prog'ing	21.45
CP/M programmers Encyclop	18.45
CP/M Plus Handbook	13.95
IBM PC-DOS Handbook	17.95
Introduction to Wordstar 2000	17.95
Mastering Wordstar in IBM PC	18.95
Assembly Lang. for the IBM PC	22.95
Business Graphics for IBM PC	9.95
Working with dBASE II	9.95
1-2-3 for Business	16.95
Symphony Tips, Tricks & Traps	19.45
Using 1-2-3 (2nd. Ed.)	18.45
Using Microsoft Word	15.45
Using DOS Plus Amstrad PC	9.95
Programming the 8086/8088	16.95

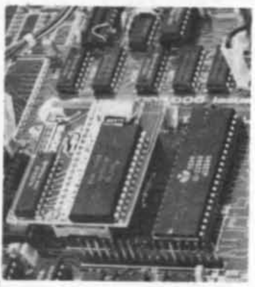
Title	Price
6502 Development Pack	7.50
Advanced Disc User Guide	16.95
Advanced User Guide Binder	4.00
Forth on the BBC Micro	10.00
ISO Pascal Reference Man.	10.00
Introduction to Logo	10.00
BASIC ROM User Guide	10.00
Micro Prolog Reference Man.	10.00
S-Pascal Manual	7.50
Into View	5.00
Viewstore Manual	10.00
6502 Applications	13.95
Using Word 2000	16.45
dBASE III A Practical Guide	10.95
CP/M Bible	16.50
MS-DOS Bible	19.95
Introduction to Wordstar	17.95
Wordstar Users' Ref. Manual	12.50
Mastering 1-2-3 (2nd Ed)	19.95
Programmers Guide to GEM	19.95
Advanced prog. dB II/III	24.95
Advanced Techniques dBASE II	22.95
Symphony Macros and Cmd Lang	21.45
Turbo Pascal for BASIC Prog's	13.95
Using Lotus Symphony	22.45
dBASE III Plus Handbook (2nd)	18.45
Using GEM on Amstrad PC	12.95

This is just a selection of the books available through the Solidisk Book Case. If you want a Computer title that is in print, please call us for availability and price. Please don't forget to add post and packing to any amount enclosed for an order from the Solidisk Book Case.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

SOLIDISK BUDGET DISC SYSTEMS

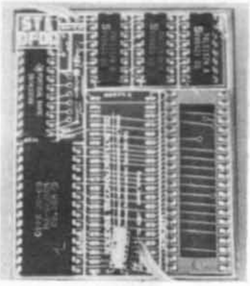
Double density disc interface



Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM .... £35.00 (order as XR/DDFS)

1770+8271, dual floppy disc controller interface

Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM .... £40.00 (order as XR/DFDC)



Low cost 3 ½ inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.
Order as 3.5 INCH-DRIVE (80 track/Double-sided) £90.00
FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.

Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.
Normally £30.00 but if order with DDFS or DFDC only £20.00
Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

DataLife
Verbatim

Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.
Normally £15.00 but if order with DDFS or DFDC only £10.00
Please mention computer model when ordering. Order as ROM2.2.

Unbeatable quality 5 and ¼ inch disc drives

Also available are NEC or MITSUBISHI 5 and ¼ inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only £109.00

Free bridge unit for twin drive systems

If you pay for two drives on a single order, we will offer you, absolutely FREE this practical BRIDGE unit. Solid steel construction, suitable for all Models of BBC and Master 128K.

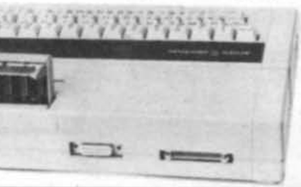
SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

SOLIDISK AUTUMN SALE

Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only: .... £50.00.

Use a disc system with built-in power supply unit.



Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.

The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.

This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.

Order as SWR32 .... £20.00

Order as SWR128 (SWR32 with 96K extension) . £50.00

NB: Manual supplied but software (not strictly required) not included.

The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.

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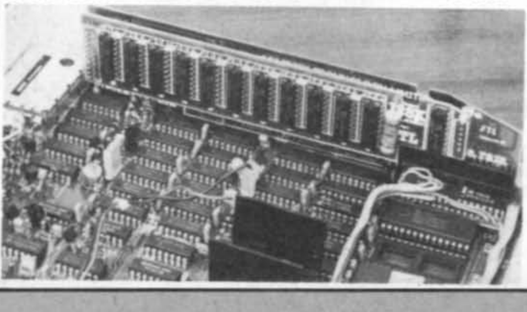

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As illustrated with Acorn Mono monitor	£598.00
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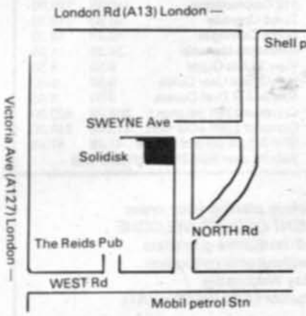

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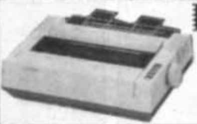

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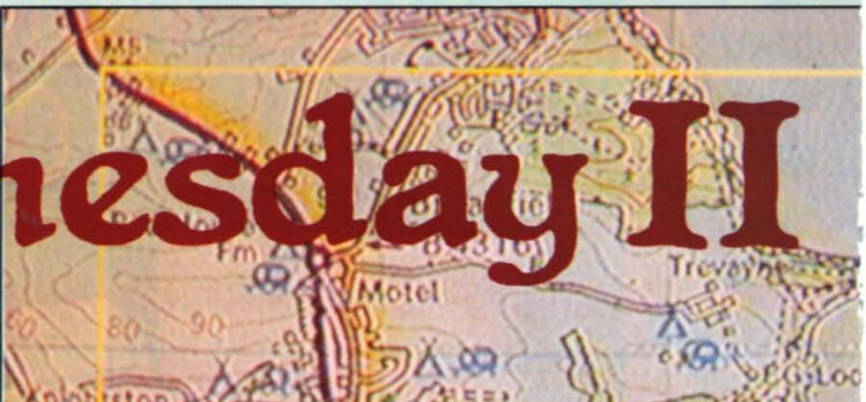
Domesday II



A million people have worked to produce a new version of the Domesday Book – with not a little help from a BBC Master. The result is the most comprehensive single view of Britain since William the Conqueror ordered his first survey 900 years ago.

By TONY LEAH

IT has been, arguably, the greatest concerted national effort since D-Day 1944. One million people throughout Britain have contributed to its fulfilment during the past two years. Now, at last, Domesday has arrived.

It comes exactly 900 years after William the Conqueror's original survey of his recently acquired kingdom – and it is a stunning achievement in the development of information technology.

The Advanced Interactive Video project – the equivalent of more than 300 weighty volumes on just two 12in videodiscs – is ostensibly the product of a partnership between the BBC, Philips Electronics and Acorn Computers funded by BBC Enterprises, Philips and the Department of Trade and Industry.

But it is materially about people, around one million of them, professional researchers and housewives, shopkeepers and schoolchildren.

Alasdair Milne, director general of the BBC, calls it an "extraordinary involvement of individuals and organisations throughout the country including over 14,000 schools".

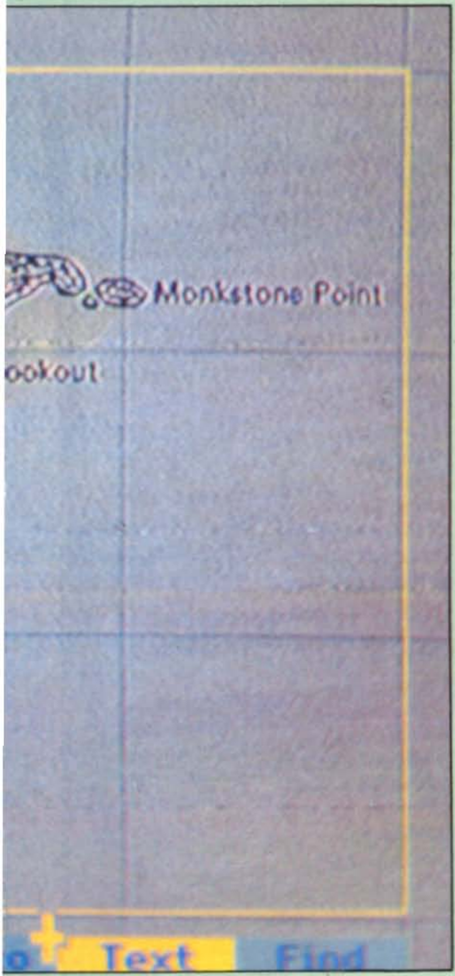
The result of their cooperation is an incredible electronic portrait of contemporary Britain containing more than 50,000 photographs, 250,000 pages of text, 24,000 maps, millions of statistics and an hour of video sequences with sound.

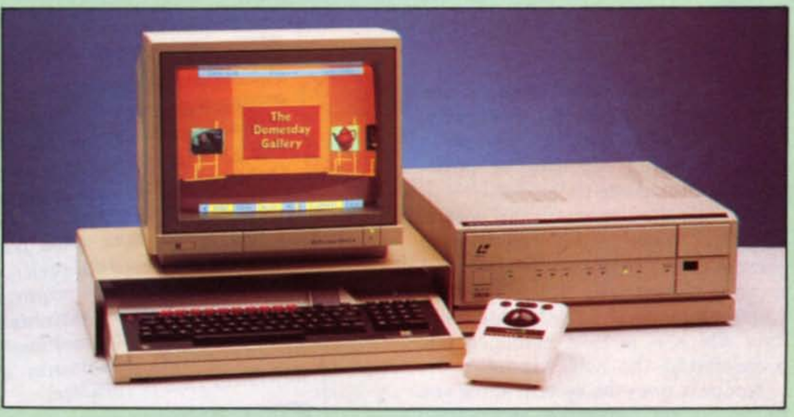
The Public Record Office has placed the Domesday Discs and BBC Master-based AIV system alongside King William's original Domesday Book so that scholars can explore, now and in the future, every aspect of Britain and the British in the 1980s as well as in the 11th century.

But as well as being a unique archive for the future, the discs have enormous current potential as a public source of information in schools, colleges, universities, libraries, and local and regional government offices.

And a whole host of applications is envisaged in areas of industry and commerce such as advertising, market research, tourism, town planning, journalism, marketing and distribution.

A joint national network of specially authorised dealers has been set up by Acorn and Philips to market the BBC AIV system, which consists of a BBC Master series AIV micro, front loading BBC LaserVision disc player from Philips, trackerball,





colour monitor, and Domesday Discs.

Schools qualify for a special grant if they buy during 1987, in addition to a DTI software subsidy.

It's all a far cry from 1086 when the original Domesday survey was completed and the results were recorded for posterity with quill pens on parchment.

If the 1986 version was printed it would fill more than 300 Domesday Books and be beyond the resources of all but a small band of academics and institutions of learning.

What has made the mighty project feasible is the development of space-age technology whereby a massive amount of information can be managed and presented with speed and simplicity.

Compacted on disc, millions of words, statistics and pictures can be "read" by a laser in the advanced computer-controlled interactive videodisc system.

Using keyboard or trackerball, the BBC AIV system user has immediate access to maps, photographs, aerial views, descriptions, statistics, charts and moving video sequences.

And, since the high-tech elements take care of the complexities of accessing the information, using the Domesday Discs couldn't be simpler.

The National Disc contains information about the economy, culture, society and the environment. You can locate the material you want by starting at one of these main subject headings and, using the trackerball, specifying progressively more precise keywords as you home in on your target data.

At each stage the system tells you what is available as text, data or pictures on the subject you choose. Alternatively, if you already know the keyword covering the subject you want, you can type it in immediately – it doesn't matter what level you start to explore the subject, you can still find your way to what you want.

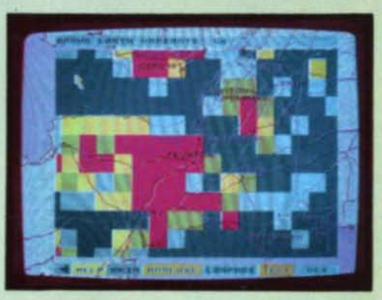
This "discovery learning" procedure is illustrated in an entertaining way by what are called surrogate walks. Some of the 20,000 photographs on the national disc are used to present a series of contemporary environments such as typical houses, a market town, a farm or a nature reserve.

Using the trackerball you can explore these environments as if you are walking through them, discovering what is going on there in precise photographic detail.

The Community Disc is based on Ordnance Survey maps and the information it contains can all be accessed from these maps.

You can move from map to map either horizontally – moving across the country on maps of the same scale – or vertically by moving to a map at another scale. At each level, text and photographs are instantly available, including satellite views of larger geographical areas.

It is even possible to measure accurately and automatically the distance between two points on a map – either directly or by road – or the area within any boundaries you care to set.



You can control the system in any of four ways – by entering a place name, by entering a grid reference, by specifying a keyword, or by map-walking with your trackerball.

Using the Community Disc in this way is like making a journey of exploration. At any point you can move along a road, check where you are generally by zooming out to a lower level of magnification, or find out more about places of interest by zooming in and requesting photographs and text information.

The system is also able to access

→

From Page 33

and display both visual material and data from the same disc. For example, you can call up a map of an urban area and superimpose population and land-use data on it.

You can then compare the data in different ways – the system will present it in bar charts or pie charts to your choice. All this is done by combining visual information with data which is in turn managed and presented by the BBC Master.

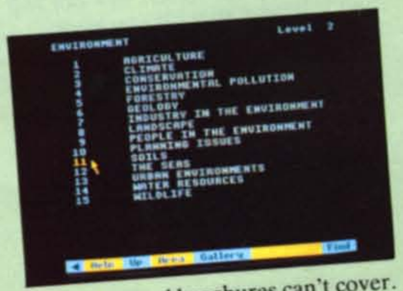
Not only does the system allow you to access an extensive and varied database and use it in conjunction with high quality still or moving pictures with sound, it also produces an impressive still-frame display and permits the accurate overlaying and mixing of pictures with computer-generated data and graphics.

The Domesday Project/BBC AIV system is the first in the world to assemble so wide a range of information at a single source and present it interactively. But its technological achievement almost pales beside its other implications.

Commercial organisations now have a means of accessing likely market areas. National and local government statistics, locally written descriptions, maps, pictures, charts and tables can be accessed without moving from an office desk. Facts can be checked without even having to dial a telephone number.

The speed and accessibility of the Domesday System allows any firm to locate and compare information on demand, in order to plot a transport network, select sites for warehouses, or solve any other problem which requires detailed local information.

Tourism and travel organisations now have the technology to provide objective answers to questions that timetables and brochures can't cover. For the first time it is possible to explore the country on screen, plotting routes, calculating distances, and viewing the landscape.



```
ENVIRONMENT                          Level  2

    1          AGRICULTURE
    2          CLIMATE
    3          CONSERVATION
    4          ENVIRONMENTAL POLLUTION
    5          FORESTRY
    6          GEOLOGY
    7          INDUSTRY IN THE ENVIRONMENT
    8          LANDSCAPE
    9          PEOPLE IN THE ENVIRONMENT
   10          PLANNING ISSUES
   11          SOILS
   12          THE SEAS
   13          URBAN ENVIRONMENTS
   14          WATER RESOURCES
   15          WILDLIFE
```

Land and estate agents have unique and impressive technology to demonstrate the characteristics and amenities of their area. Maps can be displayed at many levels of magnification, air and ground photographs can show the style and appearance of a district, and all this local and regional information can be presented instantly and impartially.

Libraries will have a rapid interactive method of locating information instead of laboriously finding and scanning books and catalogues – and then repeating the performance for

→

Technical specification

Domesday Discs

The LV-rom format allows up to 324Mb of digital data to be stored on the disc (read only) as well as up to 54,000 analogue video frames. Data may be replaced with analogue audio where required on disc, allowing either video/data or video/audio to exist simultaneously at any point. Maximum data download rate is 150k/sec.

BBC Master AIV Micro

This is a derivative of the Master series micro from Acorn incorporating:

- **All the features of the Master 128 with 128k memory, including 64k main memory, 64k sideways memory, 128k rom (Basic, Edit, View, Viewsheet, ADFS, DFS, and operating system with extended graphics), interfaces for disc, cassette, parallel printers, serial RS232, with user port, 1MHz bus, analogue input, and RGB and video output.**
- **Turbo Coprocessor (65C102).**
- **Internal Small Computer Systems Interface (SCSI).**
- **Trackerball for selecting items on the system display.**
- **Video Filing System rom. This is a combined filing system and service rom for reading data and programs from LaserVision discs in the LV-rom format. It also provides software support for the trackerball and display pointer.**

A kit to upgrade the Master 128 to Master AIV is available.

BBC 415 LaserVision disc player

This is a front loading device specially developed by Philips Electronics to read and transfer digital data to a host computer system, and to read and display video pictures from a LaserVision disc.

The unit incorporates a semiconductor laser, electronic timebase corrector with sync inserter, RGB output, RGB graphics overlay, LV-rom decoder, and RS232 interface. An integral SCSI allows data downloaded from an LV-rom to be output to an external computer as well as enabling commands to be sent to the player.

Philips CM8533 colour monitor

This is a 14in medium resolution (600 lines) model with 0.42mm dot pitch etched tube plus amplifier and loudspeaker. Inputs are provided for CVBS (via phono socket), linear (analogue), RGB (via Euroconnector), TTL RGB (via DIN) and audio (via phono socket).

Controls allow adjustment of brightness, contrast, saturation, sharpness, height, width, horizontal centring, vertical centring, green screen only, scanning time constant and volume.

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We will be stocking the range of Amstrad PC1512, Opus PC II and Tandon computers along with software titles such as VP Planner, VP Info, Executive Writer, Supercalc 3, Wordstar 1512, Word Junior and many more applications.

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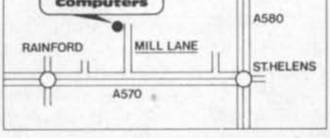


the next reference.

Courier and delivery services now have instant access to large scale maps with associated information. They can measure any distance by road simply by placing a pointer at either end of the journey and asking the computer to work it out, as well as planning routes with the aid of a multi-level nationwide set of maps.

Schools and colleges have a discovery learning tool on a scale never before imagined – facts and images galore on a multi-level, multimedia nationwide canvass.

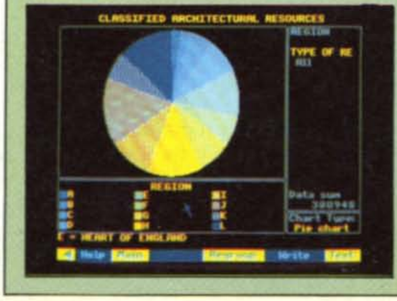
Local and national government offices get an instant database of facts and associated social information.

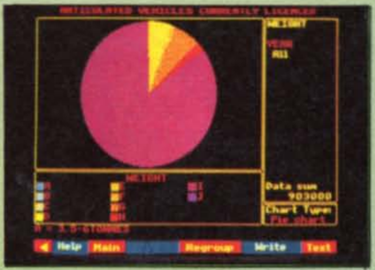
Writers and journalists can assemble facts, events, opinions and images relevant to their work in a comprehensive and coherent way never before possible from a single source. The Domesday System also makes an inspiring "ideas generator", tracing connections and providing new overviews of a wide variety of subjects.

Film and television companies searching for locations will be able to check the appearance and facilities of an area without leaving the studio office. They can call up aerial photos, maps and plans, pictures of prominent features and a mass of background information about conditions in the area they are considering.

Regional development agencies and other similar organisations have a means of displaying the facilities of their area, comparing them with other locations, and using high-tech presentations as a means of convincing would-be investors.

The National Disc brings together data, text and pictures on a wide range of subjects and includes an extensive video record of Britain in the 1980s.





Sources include the 1981 population census, the General Household Survey, the Family Expenditure Survey, and the BBC's own Daily Life in the 1980s. Texts are drawn from newspaper and magazine articles, extracts from Hansard and specially commissioned essays.

The information on this disc is organised into four main groups – culture, economy, society and environment.

Culture includes arts, beliefs, language, leisure, religion, sports, customs, fashion, media, crafts, and traditional festivals.

Economy covers personal finance, national economics, industry, public sector finance, labour relations, prices and consumption.

Society includes education, health, housing, defence, welfare, people, events, transport, communications, and law and order.

Environment includes conservation, climate, agriculture, ecology, pollution, soil surveys, water resources, urban areas, wildlife, landscape, oceanography and energy.

There are 9,000 sets of data on the National Disc, all organised for rapid access through a simple system of keywords which allows you to browse over a wide area or home in on a specific subject.

The Community Disc contains 150,000 screen pages of text and 20,000 photographs and, despite this cornucopia, is probably the easiest part of the system to use.

Organisation of this disc is based on 24,000 Ordnance Survey maps arranged in six levels with text and photos available at each level.

Level 0 is the United Kingdom, including the Channel Islands, Orkneys and Shetlands, with satellite photographs and text.

Level 1 comprises counties and island groups, with satellite and aerial photos and text.

Level 3 contains 40km by 30km regions, with aerial photographs, text and maps.

Level 4 has four km by three km local blocks, with community photographs, text and maps.

Level 5 contains street maps, special feature photographs and text.

Level 6 has floor plans of notable sites, special feature photographs and text.

You can enter the system at any level by typing in a place name, regional description, grid reference or by using the trackerball to move a pointer on the screen. At any level it is easy to move across a map, access photographs and move to levels above and below.

The fact-gathering portion of the Domesday Project was managed by the BBC. The project team, together with data sub-contractors at universities and research institutions, sifted and collated vast quantities of information from all over the country and coordinated software and technical groups, system designers and manufacturers.

Masses of data from public and official sources were assembled, edited and presented as text, statistics diagrams and overlays on maps. Some 22,000 photographs, many representative contemporary articles and reports, and more than 1,500 text items and specially commissioned essays were eventually selected.

More than 15,500 schools and community organisations gathered the local information, tackling four km by three km blocks, sending in data, descriptions and photographs of their local communities. A team of specially trained readers at Loughborough College worked for eight months preparing and processing this material.

The result is the most comprehensive and authoritative source on the life of a nation the world has ever seen.

It's an all-singing, all-dancing mine of information – a time capsule for every home, classroom and office. And even the discs are pretty ■

Electronic experimentation

MIKE COOK reviews an educational applications board for the BBC Micro

THE Plymouth open learning systems are a series of educational packages designed to be used by schools, colleges and industry, or even for self study of a topic. Two electronics packs and three on microelectronics are included and cover both theory and practice.

The Microelectronic packages contain their own Z80 processor as well as an applications board. This latter, reviewed here, can be connected to your BBC Micro with the aid of a small interface pod.

Unpacking the box reveals two manuals (34 and 207 pages), a power supply, interface pod and the board itself – positively bristling with all sorts of components just waiting to be controlled. And there is a probe lead and a plastic tray with lid to accomodate the board.

Connections with the micro are made by the interface pod, a white plastic box sprouting three cables. One is connected to the applications board and the other two to the micro's user and printer ports.

The box seemed quite heavy so I opened it up, only to find that whatever is inside it is potted in black epoxy resin. This improves reliability and keeps the circuit a secret but it makes servicing impossible.

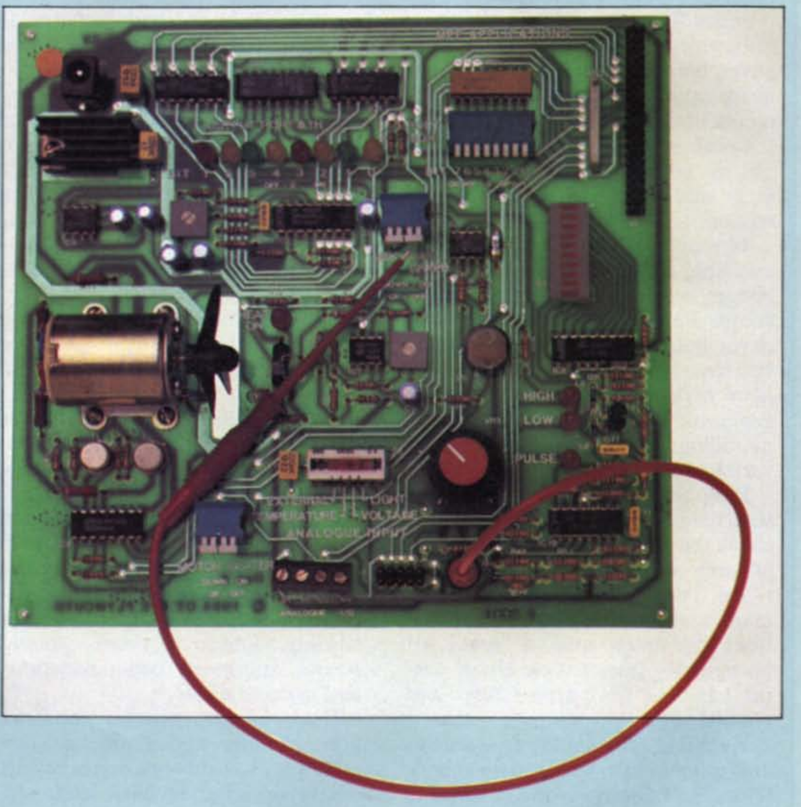
However, I suspect that there is just a passive transition board inside that will be impossible to damage.

The applications board has been cleverly designed to pack the maximum number of interfaceable components into the minimum space.

An eight way switch allows individual components to be switched off or over to computer control. There are coloured LEDs (red, green and yellow) and a digital to analog converter as well as a motor, heater, temperature sensor and infra-red beam.

A bar graph, light sensor, comparator and potentiometer complete the list of major components, all arranged quite cleverly to give maximum interaction.

For example the heat sensor is on top of the heater which is cooled by a propeller on the motor, and the infra-red beam is cut by the propeller.



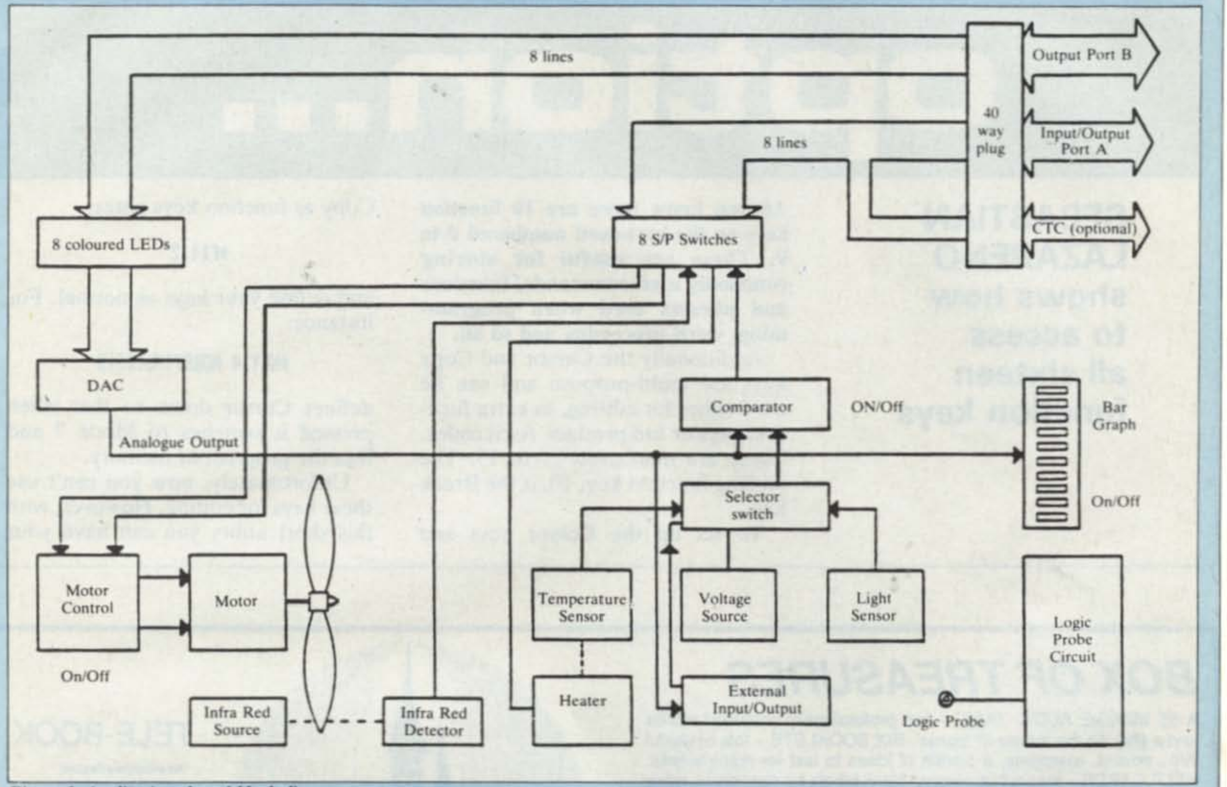
The user manual consists of a brief description of the system along with circuit diagrams of relevant sections. It also contains the connecting instructions and a detailed list of all the connections on the board.

The applications manual is more substantial and contains the experiments you can perform with the board. There are 15 in all, covering a wide range of applications.

Each experiment has its own chapter that begins by describing the concepts of what you are about to do. This includes a description of what you want the program to do and a flow diagram.

In the earlier sections there are even programs you can type in. Most of the example programs are written in Basic with only the odd dip into machine code.

The procedure section asks you to perform various tasks to enable you to explore the setup under investig-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Motor
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Light Sensor
Logic Probe Circuit
On/Off
Heater
External Input/Output
Logic Probe
Infra Red Source
Infra Red Detector

Figure 1: Applications board block diagram

ation. A number of questions follow, then you are asked to modify the program to perform slight variations on the task.

Fortunately all the questions are answered in the back of the book and a summary encapsulates what you have just learnt.

I found the experiments covered a wide range of situations and that they were nicely graduated, getting more complex as you worked through them.

The set experiments by no means exhaust the capabilities of the applications board – you can progress to make up your own or repeat those printed in machine code or another high level language. I would recommend Forth for a control application like this.

The board is well made on a double-sided, plated-through-hole PCB. If you wanted to you could assemble the same components for a much lower price – what you are paying for is the convenience of having a ready assembled unit and the carefully worked out series of experiments.

The package allows you to concentrate on control rather than construction and as such I found using the board a rather antiseptic experience.

But then I have always been addicted to the scent of a hot soldering iron. ■

Product: BBC Computer Applications Board
Price: £175
Supplier: Plymouth Open Learning Systems Unit, The College of Further Education, Kings Road, Devonport, Plymouth PL1 5QG.
Tel: 0752 26462

PROBLEM

I HAVE rigged my computer so that the sound can be switched between the internal speaker and a stereo. All games work OK when either speaker is connected and going, but I have found that if the sound is output to the stereo without the stereo turned on some of my games crash. Can you explain why this happens? – Chris Putt.

SOLVED

This is a bit of a puzzle as there is no reason why it should happen. However, as it does you could try fitting a high impedance isolating transformer between the computer and the hi-fi. Maplins sell a suitable one: LT44 order code HX82D.

The soft option...

SEBASTIAN LAZARENO shows how to access all sixteen function keys

AS you know there are 10 function keys on the keyboard numbered 0 to 9. These are useful for storing commonly used commands, functions and phrases used when programming, word processing and so on.

Additionally the Cursor and Copy keys are multi-purpose and can be used either for editing, as extra function keys or can produce Ascii codes. These are numbered 11 to 15. The missing function key, 10, is the Break key .

To set up the Cursor keys and Copy as function keys enter:

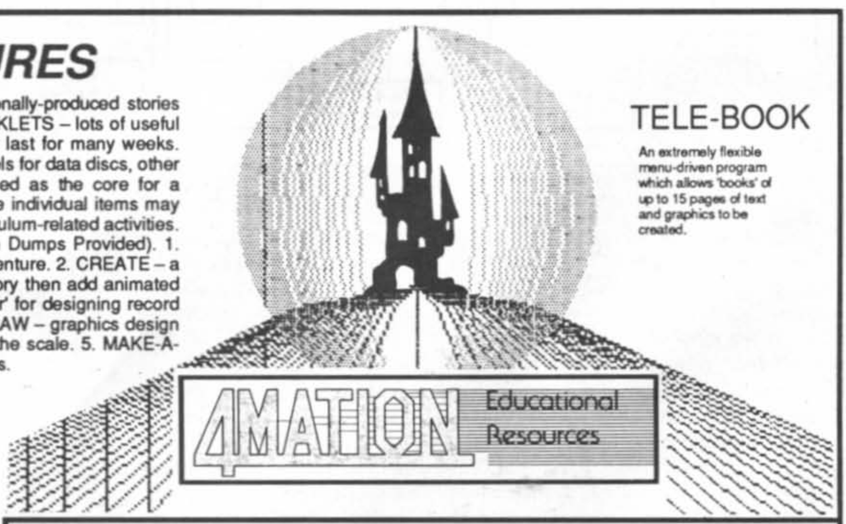
```
*FX4,2
```

and define your keys as normal. For instance:

```
*KEY14 MODE7¦MLIST¦M
```

defines Cursor down so that when pressed it switches to Mode 7 and lists the program in memory.

Unfortunately, now you can't use these keys for editing. However, with this short utility you can have your



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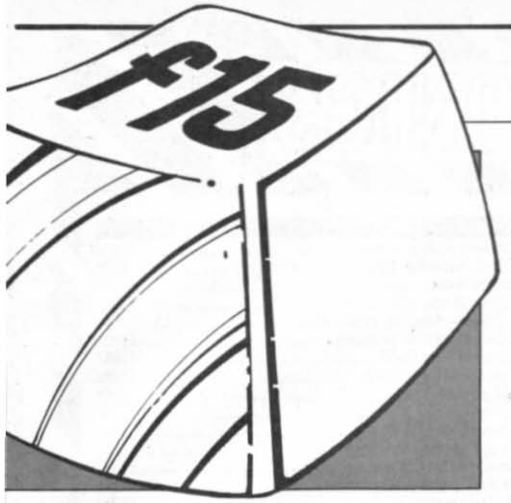

cake and eat it! You can use function keys 11 to 15 and still use them for editing.

Enter and run the program. You'll find that now you can still use the Cursor and Copy keys as usual. And if you hold down the Shift key as well they act as normal function keys.

The Break key is only of limited value as a function key and is often used to simply restore and re-run a program. This utility uses Shift+Tab as key 10, making it a true function key.

To reset the keys as they were press Control+Shift+Copy and to enable them again press Control+Copy.

The program assembles a short piece of machine code and stores it in page 9. It can be saved with:

```
*SAVE FUNC 900 +99
```

and then simply *RUN when you need it.

The routine inspects each character to be inserted into the keyboard buffer by intercepting the Insert into buffer vector at &22A/B.

The effect of pressing Shift+Cursor depends on the cursor editing status set by *FX4 and the soft key status set by *FX226.

A check is first made to see if the routine is enabled. If it is and Shift plus a Cursor key or Copy is pressed the two status bytes are altered to enable it to act as a function key.

The status is restored afterwards and the routine jumps to the original address that was stored in the vector.

You'll find this utility especially useful with word processors such as Mini Office II, Wordwise and View where the extra function keys enable you to store an additional six commands.

Simply *RUN the code and then define your keys – have fun experimenting. ■

```
   10 REM Function Keys
   20 REM By S. Lazareno
   30 REM (c) The Micro User
   40 PRINT'"SHIFT+COPY/cursor keys=f
11-f15"
   50 PRINT"TAB+SHIFT=f10"
   60 PRINT"Turn off with SHIFT+CTRL+
COPY"
   70 PRINT"Turn on again with CTRL+C
OPY"
   80 insv=&22A
   90 FOR opt=0 TO 2 STEP 2
  100 P%=&900
  110 [OPT opt
  120 LDA #start DIV256
  130 CMP insv+1
  140 BNE init
  150 LDA #start MOD256
  160 CMP insv
  170 BEQ start-1
  180 .init
  190 LDA insv
  200 STA oldinsv
  210 LDA insv+1
  220 STA oldinsv+1
  230 LDA #(start MOD 256)
  240 STA insv
  250 LDA #(start DIV 256)
  260 STA insv+1
  270 RTS
  280 .start
  290 PHP
  300 PHA
  310 CPX #0
  320 BNE softoff
  330 CMP #&BB
  340 BEQ routineoff
  350 CMP #&AB
  360 BEQ routineon
  370 LDY routineflag
  380 BEQ softoff
  390 LDY statusflag
  400 BNE active
  410 LDY &272
  420 STY oldsoft
  430 LDY &27D
  440 STY oldcur
  450 .active
  460 CMP #9
  470 BNE nextest
  480 LDA &25A
  490 AND #8
  500 BEQ end
  510 PLA
  520 LDA #&9A
  530 PHA
  540 .nextest
  550 CMP #&A0
  560 BCS softoff
  570 CMP #&9A
  580 BCC softoff
```

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```
  590 LDA #2
  600 STA &27D
  610 LDA #1
  620 STA &272
  630 STA statusflag
  640 BNE end
  650 .routineoff
  660 LDA #0
  670 STA routineflag
  680 BEQ softoff
  690 .routineon
  700 STA routineflag
  710 PLA
  720 LDA #0
  730 PHA
  740 .softoff
  750 LDA oldcur
  760 STA &27D
  770 LDA oldsoft
  780 STA &272
  790 LDA #0
  800 STA statusflag
  810 .end
  820 PLA
  830 PLP
  840 OPT FNequb(&4C)
  850 .oldinsv
  860 NOP
  870 NOP
  880 .oldsoft NOP
  890 .oldcur NOP
  900 .statusflag BRK
  910 .routineflag NOP
  920 ]
  930 NEXT
  940 CALL&900
  950 END
  960 DEFFNequb(A):?P%=A:P%=P%+1:=opt
```

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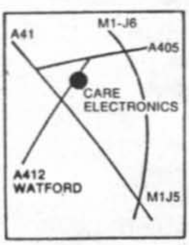

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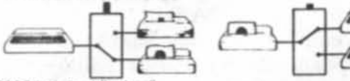

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You don't have to be dim or loopy

By PETE BIBBY

THIS month we'll carry on our exploration of READ and DATA, the Basic keywords we met last time. And the emphasis will be on the things that can go wrong.

Having said that, there's nothing wrong with Program I as you'll find if you type it in and run it.

```
10 REM Program I
20 sum=0
30 DIM mark(5)
40 FOR loop=1 TO 5
50 READ mark(loop)
60 sum=sum+mark(loop)
70 NEXT loop
80 PRINT sum
90 DATA 10,11,12,13,10
```

Program I

As you can see, the program has totalled the numbers found in the last line and printed out the result. Line 20 gives the numeric variable *sum* the value 0. This will be used to hold a running total. Line 30 dimensions an array of six variables, *mark(0)*, *mark(1)*, and so on to *mark(5)*.

The FOR...NEXT loop cycles five times and each time the READ of line 50 takes a successive value from the line beginning with DATA and puts it in *mark(loop)*.

As *loop* increases by one for each cycle, so the values in the data line are copied into the elements of *mark()*.

Line 60 ensures that the running total of these values is held in *sum* and, once the program drops out of the loop, line 80 displays the result of all this feverish activity.

To sum up, the READ statement causes the BBC Micro to take a value from a data line and give it to a variable.

The micro always keeps track of whereabouts in the data list it's up to and then READs the next unused item on the list.

In a way the READ command works exactly like the INPUT command except that instead of looking to the keyboard, the micro looks at the program itself for the value to be assigned to the variable.

And it's a very adaptable method. If we want to give the program different values all we have to do is to change the data statement of line 90.

BEGIN HERE
Part 13

So, to add up 19, 12, 8, 13 and 3 we just change line 90 to:

```
90 DATA 19,12,8,13,3
```

while:

```
90 DATA 3,15,4,19,17
```

gives us the sum of 3, 15, 4, 19 and 17.

Notice that so long as we stick to adding five numbers, only the data line needs changing. The rest of the program remains unaltered.

Suppose we wanted to add up six or ten figures? What would we have to change? If you can't see the answer you must be dim or loopy!

You'll have seen from all this that the commas in the data statements act as separators. They come between the numbers, telling the micro where one item of data ends and another one starts.

Obviously they're very important and Program II shows what happens if they're left out.

```
10 REM Program II
20 sum=0
30 DIM mark(5)
40 FOR loop=1 TO 5
50 READ mark(loop)
60 sum=sum+mark(loop)
70 NEXT loop
80 PRINT sum
90 DATA 10,1112,13,10
```

Program II

We get the horrible message:

```
Out of DATA at line 50
```

and the program stops.

What's happened is that we've left

→

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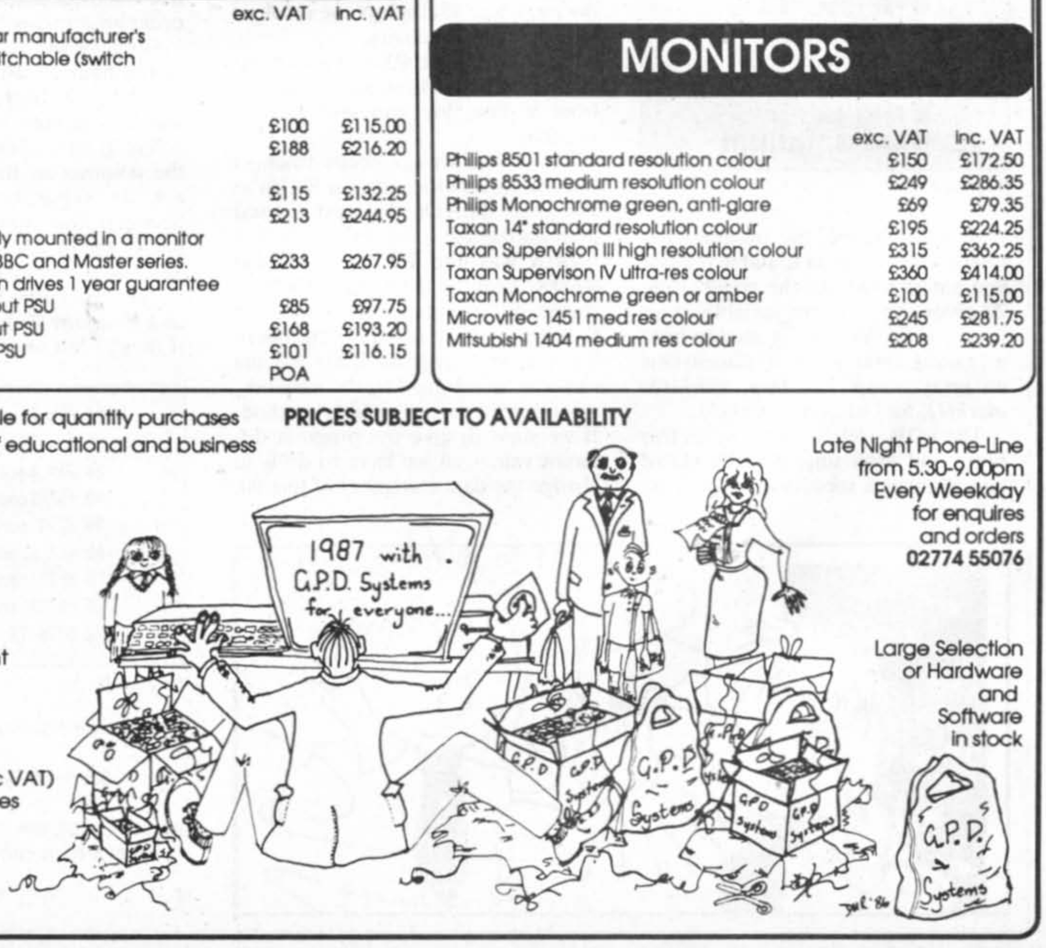

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From Page 43

out the commas that should have come between the 11 and 12 of the data statement.

The first four times round the loop the program reads in the values 10, 1112, 13 and 10. The computer doesn't know that 1112 was intended to be two numbers. It just reads the numbers between the commas.

When the loop cycles for the fifth time, the READ of line 50 tells the micro to take a value from the data line and put it into *mark(5)*.

The trouble is that the cupboard is bare. There's no more data in the data line as it only has four numbers and they've all been read. Something's got to give and it's the program which crashes. All for the lack of a comma.

A point to to bear in mind is that although the error message accuses line 50 of being the culprit, the mistake really lies in line 90.

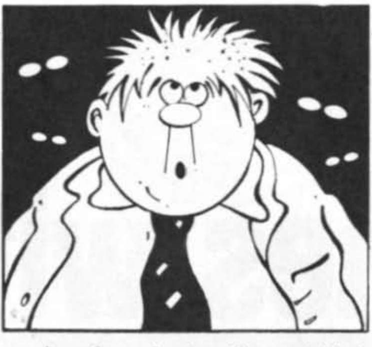
So if you get an error message that points to a line containing a READ, remember that the mistake might lie in a data statement elsewhere in the program.

Program III shows the opposite case, where an inadvertent comma between the 1 and 3 that should make up 13 results in the data line holding six items.

Can you guess the effect on the program? Run it and see what happens.

The result is 37 and not the 56 we should have got. Notice that the micro doesn't know that anything has gone wrong.

You get no error message. After all, why should you? The program tells the computer to read in five numbers from the data line and this it does.



```
10 REM Program III
20 sum=0
30 DIM mark(5)
40 FOR loop=1 TO 5
50 READ mark(loop)
60 sum=sum+mark(loop)
70 NEXT loop
80 PRINT sum
90 DATA 10,11,12,1,3,10
```

Program III

It has no way of knowing that 1 and 3 should have been 13. Or that the 10 that should have been added into the total has been ignored.

Even worse, if there was another READ with a corresponding data line elsewhere in the program then things would be out of step. The first number to be read would be the 10 of the first data line, not the initial item in the second data line.

This kind of mistake can lead to all sorts of problems in longer programs and can be very difficult to detect.

Until now the lines beginning with DATA have been tucked away at the end of the program, all the information being held on one line. This doesn't have to be the case as Program IV shows.

```
 10 REM Program IV
 20 DATA 10,11
 30 sum=0
 40 DIM mark(5)
 50 FOR loop=1 TO 5
 60 READ mark(loop)
 70 sum=sum+mark(loop)
 80 NEXT loop
 90 PRINT sum
100 DATA 12
110 DATA 13,10
```

Program IV

Despite the fact that there are now three data statements, the program still works as before. All that happens is that when the BBC Micro comes across a READ for the first time, it looks through the program for the first occurence of a line beginning with DATA and reads from that.

As more data is required, so the micro hunts it down. When all the data in one data statement has been used, it searches through the program for the next data statement and uses the items in that.

This means that the data statements can be scattered all over the program and the micro can still keep track of them. The trouble is that in a long program *you* might not.

It's good programming practice to group all your data statements together in one place so you can find them.

Usually it's at the beginning or end of a program. Alternatively you could have them near the bits of code that use them. Either way, merely because you can scatter your data lines throughout the program like confetti, doesn't mean you have to!

And if you must, beware the fate of Program V.

When you run it, the micro gives you a nasty:

```
No such variable at line 60
```

message and promptly stops.

And – as we're getting to expect with READ and DATA – even though we get an error message when things go wrong, it points to the wrong line!

```
 10 REM Program V
 20 DATA 10,11,
 30 sum=0
 40 DIM mark(5)
 50 FOR loop=1 TO 5
 60 READ mark(loop)
 70 sum=sum+mark(loop)
 80 NEXT loop
 90 PRINT sum
100 DATA 12
110 DATA 13,10
```

Program V

You could spend ages looking at line 60 wondering what mistake it contains when, in fact, it doesn't have any.

The error actually lies in line 20 where we've put an unnecessary comma after the 11. It's easy to do but the micro doesn't like it. So beware! Do not end data statements with a comma!

● *And that's where we'll leave it for this time. Next month we'll be using READ and DATA to help us take our arrays into another dimension.*

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IN this series we're going to be looking at the techniques used in machine code games: Sprite print routines, collision detection, animation and coping with large numbers of sprites.

ROLAND WADDILOVE sets off on a tour of techniques that will easily transform your machine code games

MACHINE CODE GAMES

Part 1

We'll build up a library of useful routines that you can incorporate into your own games and there will be several programs demonstrating their use.

They will all run on the BBC Micro, BBC B+, Master series and Electron, Basic I, Basic II, ADFS and DFS – so it doesn't matter what you've got.

Regular readers of *The Micro User* will recall Kevin Edwards' excellent series on writing machine code games which ran from February to September 1985.

I'm going to continue where Kevin left off, and assume that you've read his articles and typed in the listings. If you haven't then I suggest that you order the back issues immediately.

You'll certainly need the sprite designer from the June 1985 issue if you want to try out your own ideas. The programs are all available for downloading from Microlink.

Kevin's series discussed the Mode 2 memory map and covered simple sprite routines, reading the keyboard, generating random numbers and high score tables – the building blocks of machine code games.

To start my series I have combined several of the techniques already discussed with a few extra features, so some of it will be familiar and some will be new.

First of all enter the listing, run it and see what happens – if you've entered it correctly a coloured ball will appear.

It's fairly simple as machine code games go but there's a lot to learn from it. We'll break it down into simple sections and see what is going on.

Notice that the sprite is animated and apppears to rotate about a vertical axis. It is also under cursor control so press the cursor keys to move it round the screen.

You'll find that you can't move it out of the box in the centre of the screen.

And if you move it through the text you'll notice that it moves behind the first word, in front of the second and behind the third, just like the hardware sprites found on Atari and Commodore micros.

The sprite print routine labelled *print* starts at line 740 and uses the EOR method. If you followed the earlier series you will have seen several variations of this before.

Designed with animation in mind it runs from left to right printing each column of the sprite by EORing the data with the screen memory.

An animated sprite consists of several "frames" which are printed one after the other with each new frame being slightly different from the previous one – rather like a cartoon made up of separate drawings.

The print routine prints the new frame at the new address. At the same time the old frame is being erased from the old address.

The print routine expects the screen address of the old frame in *old* and the address of the new frame in *new*.

The old data address should be in *olddata+1* and the new data in *newdata+1*. The size is passed in *X* and *Y* where *X* is the number of columns and *Y* the number of rows.

To place a sprite on the screen initially the old address and data are unimportant because there's no previous frame to erase. Set *new* and *newdata* then call *put* instead of *print*. This puts a dummy address in *old*.

The frame number is stored in *frame* and is used to index into the character data table at line 1020. The address of the data for the first frame is stored at *data*, the next is at *data+2*, then *data+4* and so on.

There are four frames altogether and *frame* is incremented by two each time since each entry in the data table is two bytes long. You can see this in line 400.

To simplify the programming the sprite's position is stored as coordinates in *x%* and *y%*. The print routine requires the screen address so a call is made to *convert*.

This is a modified version of the

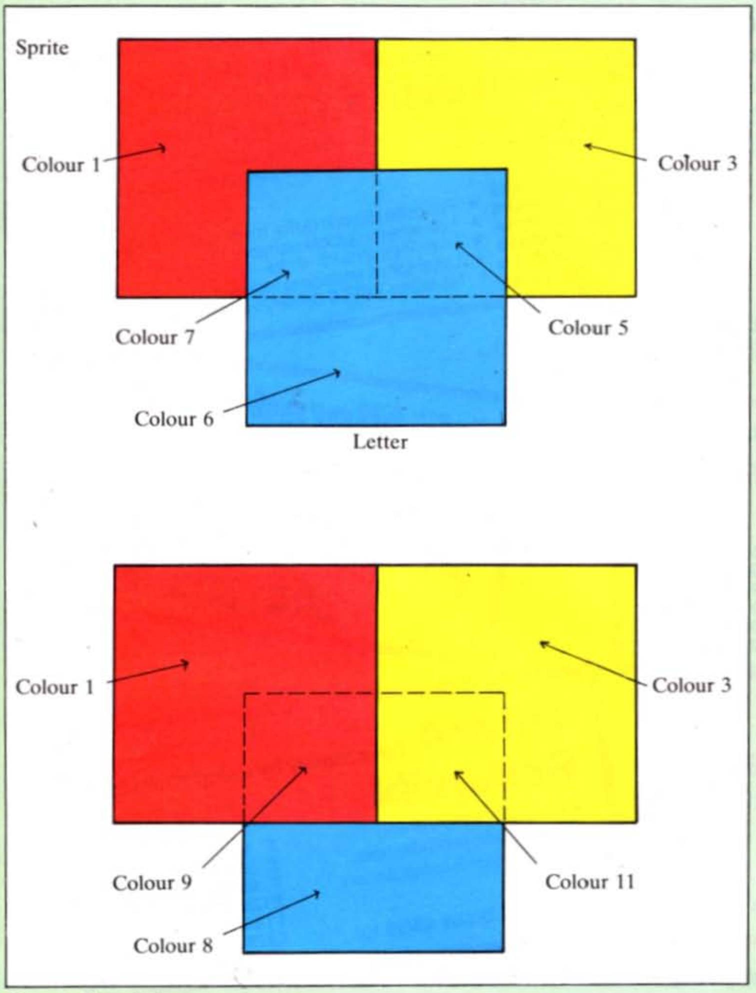

Figure I: The palette

convert routine used in the first series.

I've changed it so that it no longer relies on the OS rom for the 640 times table, but indexes *table* at the end of the code which stores the address of each screen line.

Any routine which relies on tables in the rom is likely to fail if Acorn decides to change it. This is one of the (many) reasons why some programs will not run properly on the Master series.

The program uses macros to save typing. A macro is a section of code which is given a name: When that name appears in the program the whole of the macro code is inserted.

For example line 520 is:

```
OPT FNinkey(-122)
```

which is used to test whether the cursor right key is pressed and is just like Basic's INKEY(–122). Notice how simple it is.

When the assembler comes to this line it stops assembling and evaluates the function *FNinkey* at the end of the program.

This re-enters the assembler, inserts the code and exits setting the assembly option to *pass,* which is what it was anyway. The assembler then carries on assembling .

Notice that the sprite's movement is restricted to the box in the centre of the screen. It needn't be in the centre – we could set up a sprite window anywhere on the screen.

Each of the subroutines *right, left, up* and *down* check that the sprite is within the limits set out by the box.

For instance in *right,* line 530 compares the *x* coordinate with 68 and if it is equal won't let you move any further. Similarly when going left you can't go less that 7.

One other important aspect is the way the sprite moves in front of and behind words like real hardware sprites. This is achieved by redefining the pallette. Take a look at Figure I to see how it's done.

The first word is printed in colour 6 and the sprite in colours 1 and 3. The sprite is EORed onto the screen. Now 6 EOR 1 is 7 and 6 EOR 3 is 5, so any red part of the spite on a letter will appear in colour 7 and any yellow part in colour 5.

If we set logical colours 7 and 5 to produce actual colour 6, the same as the letter, where the sprite and letter overlap appears in the actual colour of the letter. That is, the letter appears intact and the sprite will appear behind it.

Similarly the second word is printed in colour 8 which when EORed with 1 and 3 produce colours 9 and 11. These are set to produce actual colours 1 and 3, the same colours as the sprite.

Hence the overlapping parts appear in the colour of the sprite, causing it to appear to move in front of the letters.

I suppose you could call this method cheating since we aren't actually moving in front or behind anything and it does use up rather a lot of colours. However, it is quite effective and adds depth to the graphic display.

● *There is rather a lot to digest here but it's all fairly straightforward and you've got a whole month to experiment with the routines. Next month we'll be discussing collision detection methods.*

Full listing starts on Page 132

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6502 MACHINE CODE

Part XI

Try a Carry take-away

By MIKE BIBBY

WE met the Carry flag for the first time last month. As we saw, it is intimately bound up with the instruction for addition, ADC. This adds the operand (what follows the mnemonic) to the contents of the accumulator, leaving the answer in the accumulator.

There were two major points to remember for a simple addition:

- *beforehand* we clear the Carry flag to zero with CLC.
- *afterwards* the Carry flag being set indicates that we've got problems with our answer.

For instance, if we wanted to do the sum 8+6 we'd use the code:

CLC
LDA #8
ADC #6

Afterwards the accumulator will contain 14 (8+6+0) and the Carry flag will be clear, to indicate that all's gone well.

(Notice we're using immediate addressing – that is, the accumulator is loaded with the value 8, not the value of the contents of memory location 8.)

On the other hand, if the sum were:

CLC
LDA #2
ADC #255

afterwards the accumulator would contain 1 (2+255=1+256=1) and the Carry flag would be set to show that we'd exceeded the limits of one byte.

It will come as no surprise then, to learn that the Carry flag is also bound up in our subtraction instruction, SBC (*SuBtract with Carry*). This subtracts the operand from the contents of the accumulator, leaving the result in the accumulator.

If you bear in mind that subtraction is the **opposite** of addition the two points above translate to:

- *before* the subtraction we set the Carry flag with SEC
- *after* the subtraction, Carry being clear indicates we've got problems.

We'll see exactly what all this means later. Basically, to subtract the contents of *second* from *first* and store the answer in *result* we'd use the code:

SEC
LDA first
SBC second
STA result

Notice that here we're using absolute (or zero page) addressing – where we load the accumulator with the contents of memory location *first*.

Program I shows the idea in practice. Consisting mostly of a Basic surround, it's virtually identical to last month's Program I, except the mnemonics are for subtraction rather than addition.

If you try running it, you'll find that things work well so long as you keep *second* less than *first*.

So why set the Carry flag? The actual reason involves an understanding of some fairly complex binary arithmetic – most introductory texts seem to fudge their explanations.

My advice is that you just accept that since you clear Carry for addition and subtraction is the opposite of addition, you have to set Carry for your take-away sums.

If you do want to go a little further, you might try thinking of SBC as standing for SuBtract with Complement. Here we're talking about the complement or inverse of the Carry flag – that is, if Carry is 1, it's complement is 0, and vice versa.

So we can interpret:

LDA #8
SBC #6

as:

8-6-complement of carry.

Now if Carry is set, the instruction is interpreted as:

8-6-0

On the other hand, if it's clear, the instruction boils down to:

8-6-1

If we intend the code to do the sum 8-6, we obviously want the first interpretation, so we need to set Carry

```
   10 REM PROGRAM I
   20 first=&70
   30 second=&71
   40 result=&72
   50 add=&900
   60 REM *** Machine Code core ***
   70 FOR pass%=0 TO 3 STEP 3
   80 P%=add
   90 [
  100 OPT pass%
  110 SEC
  120 LDA first
  130 SBC second
  140 STA result
  150 .noerror RTS
  160 ]
  170 NEXT pass%
  180 REM *** Basic surround ***
  190 REPEAT
  200 REPEAT:INPUT '"First Number",nu
mber1%:UNTIL number1%>-1 AND number1%
<256
  210 ?first=number1%
  220 REPEAT:INPUT '"Second Number",n
umber2%:UNTIL number2%>-1 AND number2
%<256
  230 ?second=number2%
  240 CALL add
  250 PRINT 'number1%;" - ";number2%;
" = ";?result''
  260 UNTIL 0
```

Program I

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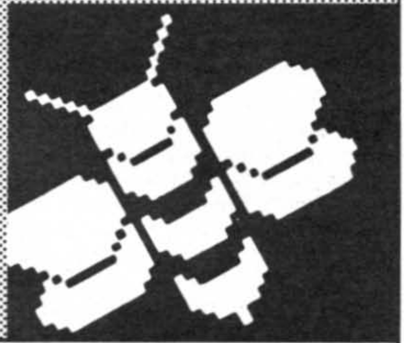

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From Page 49

before the sum. Satisfied?

Even setting Carry like this isn't infallible, as you'll find if you try to do sums such as 6-8, that is, where the contents of *second* are greater than that of *first*.

Fortunately, where what we're subtracting is "too large", the micro tells us afterwards with the Carry flag. Again, it's the opposite of addition: Carry being clear signifies trouble.

The difficulty is of course that the answers to our problem sums are negative numbers. As we've seen previously:

```
LDX #0
DEX
```

leaves &FF (255) in the X register. This is because the X register is only one byte wide and we've "cycled round" across the zero boundary.

We need to be aware of this to interpret the &FF correctly as −1. Fortunately Carry being clear warns us.

The simple way for humans to take this into account is to take 256 (&100) from the answer. Doing this, our result becomes:

255-256
= −1

This is what we do in Basic in Program II. It uses the location *carry* to hold the value of the Carry flag. Initially, we store one in *carry* to reflect our SEC, and then do the sum.

Afterwards we check and record the state of Carry in *carry* with:

```
         BCS noerror
         LDA #0
         STA carry
.noerror RTS
```

If Carry is set, there are no problems so we branch to our RTS (*carry* is already 1 so we leave it). If Carry is clear, however, we drop through to code that updates *carry* to zero:

```
LDA #0
STA carry
```

We then tidy things up via Basic.The important part is the section of line 310 that reads:

```
?result-256*(1-?carry)
```

If *carry* holds 1, the contents of *result* give the correct answer. The line above is then in effect:

```
?result-256*(1-1)
=?result
```

On the other hand, if *carry* holds zero, we need to take corrective measures on what's in *result*. The fragment of 310 is designed to take this into account, becoming:

```
?result-256*(1-0)
=?result-256
```

```
10 REM PROGRAM II
20 first=&70
30 second=&71
40 result=&72
50 carry=&73
60 add=&900
70 REM *** Machine Code core ***
80 FOR pass%=0 TO 3 STEP 3
90 P%=add
100 [
110 OPT pass%
120 LDA # 1
130 STA carry
140 SEC
150 LDA first
160 SBC second
170 STA result
180 BCS noerror
190 LDA #0
200 STA carry
210 .noerror RTS
220 ]
230 NEXT pass%
240 REM *** Basic surround ***
250 REPEAT
260 REPEAT:INPUT '"First Number",nu
mber1%:UNTIL number1%>-1 AND number1%
<256
270 ?first=number1%
280 REPEAT:INPUT '"Second Number",n
umber2%:UNTIL number2%>-1 AND number2
%<256
290 ?second=number2%
300 CALL add
310 PRINT 'number1%;" - ";number2%;
" = ";?result-256*(1-?carry)''
320 UNTIL 0
```

Program II

In other words, line 310 automatically performs the correction we've seen is needed for negative results.

In practice of course we'd use machine code itself to take these sort of things into account.

You may be wondering why Carry behaves like this. Again, it's bound up with the internal representation of numbers. I suggest you just accept it.

However, if you want to delve a bit deeper, consider the two sums 2-1 and 0-1. Each represents one of the two types of subtractions: Those with non-negative and negative results respectively.

When encountering a subtraction, the 6502 considers it not as a straight take-away but as an addition. That's correct: It doesn't actually do subtractions, but additions – you're adding a negative number!

Looked at in this light, 2-1 becomes:

2+(−1)

As we discussed above, −1 is considered to be &FF (255). Yes, I know it's a little ambiguous.... So the sum the 6502 does becomes:

=2+(−1)
=2+255
=1+256
=1

That 256 takes us round the clock, setting Carry in the process, as is usual in addition. The outcome is that the correct answer is given, with Carry set.

On the other hand, 0-1 gives us:

0+(−1)
=0+255
=255

And, since we haven't spilled over our byte size, Carry is cleared, again, as is standard with addition.

The answer is of course "wrong" and needs to be further interpreted (as −1). Fortunately in this case, the Carry flag is clear and warns us.

Hopefully these examples will give you a feel for how Carry works in subtraction sums to alert us to what's going on.

● *Next month we'll encounter a close relation of SBC, CMP, wich lets us compare bytes with the accumulator. As we'll see, it's a major building block for machine code programs.*

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The Ultimate Assembly Language Development Tool

ADE+ is a 65C00 series assembler system supporting all the mnemonics of the 65C12 used in the latest BBC microcomputers plus the additional 'Rockwell' instructions. ADE+ is fast, faster in fact than the in-built BASIC assembler and all rival products that we have tested. The assembler produces absolute code that can be *RUN or linker modules that can be merged with the output from other programs using the ADE+ linker. ADE+ supports a powerful linker which drastically cuts assembly time; a feature normally only found on minis and mainframes. The linker will even link the output from compilers with your assembly language programs. Full library support for both the linker and the assembler is proveded - fast searching for unknown instructions in a random access macro library. ADE+ is a modular system with many modules to add later; i.e. a mouse based editor & a Z80 cross assembler! A print spooling system uses sideways RAM as a print buffer to eliminate waiting time: your listing runs off as a background job! Use the print spooler from BASIC or your own programs. ADE+ uses ALL available memory. With a second processor attached the IO processor spare memory is used as a buffer to reduce the amount of disc access. All available memory is handled by ADE+'s intelligent memory management module. Use your own favourite editor or the one provided. Assemble from disc or memory. Full utilities including librarians, converter for BBC BASIC etc. ADE+ must be *the* bargain of 1986/7

The Master disassembler...

KEVIN EDWARDS provides a powerful program for all BBC Micros

THE extra instructions available on CMOS versions of the 6502 have been referred to several times in past issues of *The Micro User*.

The assembler present in the Master's version of Basic (IV) allows you to assemble the new instructions in addition to the standard ones for the 65C12. Owners of 6502 second processors can also make use of these new instructions as they are also equipped with the CMOS 65C02 processor.

The CMOS instructions are shown in Table I. It is worth noting that the Basic IV assembler permits you to use DEA, INA and CLR instead of DEC A, INC A and STZ respectively.

If you dabble with the 6502 at all you will no doubt be pleased to see PHX, PHY, PLX, PLY, DEC A, INC A and BRA, as well as the jump table speciality JMP(abs,X).

Basic IV, Edit and the operating system/terminal firmware make extensive use of the CMOS instructions. I don't know what percentage of memory has been saved by using them but program execution speed is increased by between 10 and 40 per cent for Basic IV – Roger Wilson certainly likes to squeeze every last cycle out of his routines.

To complement the assembler a CMOS disassembler is needed and that's just what this utility provides. It is split into two parts. Program I, is the source listing for the disassembler itself. Program II is the Basic driver which controls the object code from the first program.

Options allow you to select any sideways rom, turn the printer on and off and switch between the second processor and I/O processor's memory if you have a second processor/turbo card fitted.

The first step is to type in the two listings and save them. Then load in the source program with PAGE at &1900 and run it. This will automatically save the object code with the filename cmosdis.

Next load and run the driver program – again PAGE must be at &1900. The object code previously created is now *LOADed to &1100 and the option screen is displayed. There are four commands you can choose from. They are selected by simply pressing the keys D, P, R and T.

The first option D selects the disassemble mode and will request the start and end addresses in hex of the area to be disassembled. If Return is pressed in response to the end address the disassembly will continue indefinitely.

The output produced consists of the memory location being disassembled, the opcode and operand bytes, Ascii characters corresponding to the opcode, operand bytes – if printable – and finally the mnemonic and addressing mode of the instruction. In other words the output will be something like:

```
0C00 A9 41     .A   LDA #&41
0C02 20 EE FF  ..   JSR &FFEE
```

Once the disassembly has started you can stop it at any time by pressing S, then press Space to return to the option menu. Pressing any other key during disassembly advances to the next instruction in memory except when the printer is on, in which case the key presses are not required.

When the end address has been passed the disassembly aborts just as if the S key had been pressed. The P option toggles the printer on and off thus allowing you to echo the results to a printer. The printer status is displayed at the top of the screen. It's a good idea to enable the printer's paging mode so that no print is placed over the perforations. This can be achieved on Epson compatible printers with:

```
VDU 2,1,27,1,78,1,4,3
```

The American character set should also be selected so that hashes are

Mnemonic	Opcode	Mnemonic	Opcode
ADC (zp)	&72	JMP (abs,X)	&7C
AND (zp)	&32		
CMP (zp)	&D2	PHX	&DA
EOR (zp)	&52	PHY	&5A
LDA (zp)	&B2	PLX	&FA
ORA (zp)	&12	PLY	&7A
SBC (zp)	&F2		
STA (zp)	&92	STZ zp	&64
		STZ zp,X	&74
BIT zp,X	&34	STZ abs	&9C
BIT abs,X	&3C	STZ abs,X	&9E
BIT imm	&89		
		TRB zp	&14
BRA rel	&80	TRB abs	&1C
		TSB zp	&04
DEC A	&3A	TSB abs	&0C
INC A	&1A		

Table I: CMOS instructions

→

From Page 53

printed correctly instead of producing pound signs. Again for Epson printers and their clones enter:

```
VDU 2,1,27,1,82,1,0,3
```

Both of these printer options should be entered before the driver program is run. Don't forget to check the printer is on-line before entering them.

Option R allows you to select a particular sideways rom for disassembly. Whenever the memory region &8000 to &BFFF is accessed the selected rom is paged in and its contents are read.

The rom number you give must be between 0 and &F. The *romS command available on the B+ and Master series will give you additional information about the roms in your machine.

The R command will not be accepted if the driver program is being used from the second processor. This is because the osrdrm routine, which is used to access paged roms, is not implemented across the Tube. If you wish to examine sideways roms you must turn the coprocessor off first.

The final command T toggles between the second processor and I/O processor's memory. For instance it can be used to examine the Tube host code in pages 4, 5 and 6 of the I/O's memory from the Tube's memory.

The status display at the top of the screen shows the currently selected memory block. This command has no effect if the second processor is not present or active.

For those of you who are lucky enough to own a Master 128 here's some information you may find useful.

The operating system is split into three parts. The end section is between &C000 and &FFFF as in the Model B and B+. However there is also an 8k bank of ram between &C000 and &DFFF which is used by the MOS and sideways roms which claim workspace – such as ADFS and 1770 DFS.

If the region &C000 to &DFFF is accessed by a Basic program, for example, the ram will be read. To access the rom legally you must use osrdrm. The illegal method involves poking to the ram latch at &FE34, but it is certainly not advisable.

The CMOS disassembler can access the rom at &C000 because it uses the legal MOS call osrdrm (&FFB9) to read memory. Osword 5 is used to read the I/O processor's memory across the Tube when the Tube is present and the I/O processor's memory is selected.

The other main part of the MOS is in the terminal rom (&F) and stretches from &8000 to &BFFF. Rom &F contains a jumble of routines and data including the Tube host code and the character definitions, which are copied into a special shadow ram area during initialisation.

Finally a small section of the VDU drivers can be found at the end of the previously empty View rom (&E) between &BA00 and &BFFF.

If you add all that up you'll arrive at 34304 bytes of MOS/terminal. What happened to the rest of the 35k MOS? I still haven't found the missing 1,500 or so bytes.

Sideways banks 4, 5, 6 and 7 each contain 16k of ram, which is the same as the B+ 128k. The commands *SRLOAD and *SRSAVE allow programs to be transferred between the ram banks and disc – type *HELP SRAM for a list of the command syntax.

Unfortunately the MOS still doesn't allow you to write files under the rom filing system and returns Bad command with SAVE, OPENOUT and so on.

Sideways bank &80 selects the shadow ram which is between &3000 and &9000. The sideways region of which – &8000 to &8FFF – reveals the last 4k of the MOS's private workspace.

Anyway it's time for you to work through the MOS or debug your own CMOS programs. Good luck, and let us know what you find. ■

Program I

```
   10 REM CMOS disassembler source
   20 REM By Kevin Edwards
   30 REM (c) The Micro User
   40 IF PAGE<&1900 VDU7:PRINT"PAGE m
ust be &1900 or greater!":END
   50 :
   60 REM zero page usage
   70 mem_loc=&70
   80 opcode=&72
   90 instruction_size=&73
  100 temp=&74
  110 tempx=&75
  120 rom_number=&76
  130 tube_io_flag=&77
  140 tube_present=&78
  150 rom_address=&F6
  160 :
  170 REM MOS addresses
  180 osrdrm=&FFB9
  190 osnewl=&FFE7
  200 oswrch=&FFEE
  210 osword=&FFF1
  220 :
  230 FOR pass=0 TO 2 STEP2
  240 RESTORE
  250 P%=&1100
  260 [OPT pass
  270 .main_loop
  280  JSR osnewl
  290  LDA mem_loc+1
  300  JSR phex
  310  LDA mem_loc
  320  JSR phex
  330  JSR one_space
  340  LDY #0
  350  JSR read_memory
  360  STA opcode
  370  TAX
  380  LDY addr_mode,X
  390  LDX addr_mode_size,Y
  400  STX instruction_size
  410  LDY #0
  420 .print_op_bytes
  430  JSR read_memory
  440  JSR phex
  450  JSR one_space
  460  INY
  470  DEX
  480  BNE print_op_bytes
  490 .print_gap
  500  LDX #3
  510  JSR multi_space
  520  INY
  530  CPY #4
  540  BCC print_gap
  550  LDY #0
  560 .print_ascii
  570  JSR read_memory
  580  CMP #ASC" "
```

Turn to page 141

INSTANT

DATABASE SOFTWARE
Mini Office II
BBC Micro
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose then press RETURN
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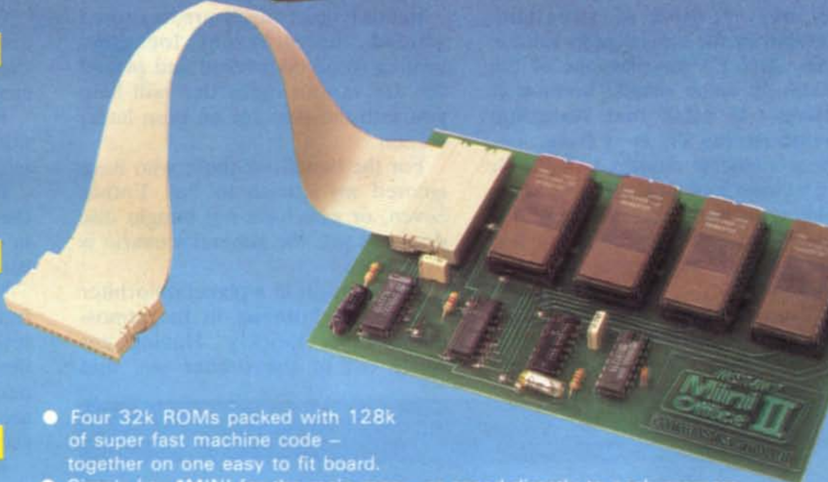
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Dying to get through Enthar Seven

by
The Mad Hatter
10/6

THIS month I want to take a closer look at the kind of situations presented by the superb game Enthar Seven. And I'll describe one of the sections in some detail, because it illustrates a point that fledgeling adventurers can shy away from.

In a couple of months I shall also take a closer look at the Forest Maze which is in another section of this game, since I've been getting a few more queries on correct mapping techniques.

Enthar Seven is like Lords of Time. It has a number of distinct sections that are really mini-adventures in themselves.

In this type of adventure, scattered around the different locations waiting to be discovered and picked up, are various items that will help you with the next (or an even later) section.

For the benefit of those who have ignored my advice to buy Enthar Seven, or who have not bought disc drives as yet, the general scenario is as follows.

You start off in a planetary orbiter destined to burn up in the atmosphere fairly quickly. Having got safely out of the orbiter you find yourself in a Command Centre.

Outside on the planetary surface are seven different areas to be explored before you can get out to a spaceship and blast off for home.

Part of Area 6 is affected by radiation and some locations are therefore lethal.

Beginners tend to shy away from the fact that it is necessary to die a lot in order to map the Radiation Field completely.

If you don't map an area like this fully you'll always have a sneaking feeling that you've missed a vital item. There's an added twist to this particular problem too – once you are in the Radiation Field, you can't save your position!

If you follow my advice and map the first few locations methodically, some useful places and items soon turn up.

There is the teleportation booth (West and West from the starting location) which is a route back to the Command Centre.

You come across a shed, (East from the start), which has a metal plate welded over the door and a tough plate-glass window on the other side.

You can't get into the shed without the diamond from the cave system (in Area 1) and since the shed contains an oxygen cylinder the diamond is doubly precious.

A geiger counter can be found by going N, N and NW from the start; this clearly is an invaluable aid to charting the Radiation Field.

In spite of the geiger counter, I deliberately kept dying of radiation poisoning, just in case there turned out to be a path through the Radiation Field that would have involved a brief stay in a hot area.

It didn't turn out that way but you

PROBLEM CORNER

Level 9's **Emerald Isle** has given a number of readers problems, particularly where the plank and canoe are concerned. You don't unfasten the plank with the pliers – use the hammer! The essential command is RELEASE PLANK.

Launching the canoe has been troublesome, too. To board it by the water's edge, enter IN CANOE and then travel using compass directions. Once on shore again you simply leave it by entering a compass direction.

This is a good adventure, if a bit old now, so Nick Southgate and other will get a more detailed treatment in a future column.

Kevin Shaw is in trouble with **Kingdom of Hamil,** in the enchanted maize. You MUST keep on returning to pick up the Talisman or the wicked spirits will get you.

Move W, E, SE, SW, W, SE, E before picking up the painting and returning NE, SE, NW, NW, NE, N and W.

F. Matthews is stuck in **Colossal Adventure** – the dragon is East of the Secret EW Canyon 15 feet above a Tight NS Canyon.

Give the troll the golden egg since it will come back when called. The Pirate's Maze is just down the coloured column. Finally, open the clam with the trident.

Sphinx problems – P. Aumayr couldn't get the jack safely. You MUST have the Mithril ring and then rub it. To open the safe, SAY DIAXOS.

The same thing will help Simon Kemp. In the Wizard's Antechamber and in the Sorcerer's Lair you will find that there is a wand to be taken.

A. Sloggett wonders what the icicle is for in **Lords of Time:** SHOUT so that it drops, and later on THROW it so that a path is formed across the lake.

The cave dwellers need scaring off. If you've enticed the brontosaurus into the mirror, drop the mirror at the cave entrance.

can never be sure about something like that. I suppose the adventurers' motto should be: De Explorationis Semper Dubitandum Est (You never can tell with adventures).

Can you think of a better (printable) one? Adventure game writers like to twist our tails!

This (Number 6) Area, involved SAVEing at the location where the radiation warning was posted then getting killed sixteen different times.

It may sound tedious, but being a disc-based game, Enthar Seven has very quick loading times and I eventually found the dollar, a vital passport to a later stage – persistence pays!

The Radiation Field spawns two odd life forms (inimical to adventureers, naturally) which need dealing with in different ways.

The mutated creature needs crushing: That is where the heavy boulder comes in useful. If you drop everything else, you can just about carry the boulder for a couple of moves or so but you must then put it down and rst from time to time.

Should you merely rest, without first dropping the boulder (as I did once) you will end up dead quite quickly.

Survival here depends on wearing the dark goggles from the supplies area beyond the bat cave in area 1, or some other available protection.

Once you have found a way through the Radiation Field, there are two more important locations which have useful items in them.

You also need to find the dried up bed of the Inland Lake, with its wrecked boat and oar. Just as important, another teleport booth can be found in this section of the game, which saves the tedium of a return through the Radiation Field.

● *See you next month. Happy adventuring.*

HELPLINE

We are still waiting for an answer to the Knight/medallion problem in ***Lord of the Rings.***

Adam Halley of Scone needs help in ***Castle of Riddles:*** *How can he solve the Black Maze?*

In Bug Byte's ***Old Father Time,*** *he can't get down the mine shaft without being killed, and can't get past the cylindrical room which has no exits.*

M. Meggs needs help in ***Programmers Revenge:*** *(Never heard of this one). What do you do with the mirror in the pavilion (if anything) and there is the usual trouble with a troll.*

Also, are the tin cans significant, why can't the brass urn be taken and where's the north exit inside Fort Knox?

I wouldn't mind seeing this game, would the author care to send a copy to the office?

HALL OF FAME

David Richards and John Tipper have both sent in good solutions to **Hampstead** and Jonathan Morris a full solution to **Gremlins.**

And Simon Ainsworth has let me have a very professional map of **Greedy Dwarf.** Thanks to you all.

Harris Irfan (a bright stripling of 14) has been leading me into sinful ways – he's investigated the innards of **Philosopher's Quest.**

If you want to read the messages to get additional help, here is what to do. Once the game is up and running, press Escape, enable your printer (optional), then type as follows:

```
FOR a=1 TO 294:procm(a):NEXT a
```

press Return and Bob's your Uncle. Being me, I had to go on and LIST the program itself.

All those naughty GOTOs and GOSUBs I found shocked me to the core.

I felt deliciously wicked just looking at them, but my colleague Pendragon on *Electron User* tells me that unfortunately this only works on early versions.

A while back I mentioned Stuart Booth of Aberdeen, who qualified for membership of the Hall of Fame thanks to his excellent solution to Level 9's **Snowball.**

I am going to serialise it over the next few issues (as space permits) for the sake of people like Vernon Leigh of Abingdon who have done well but still need help. Here is what Stuart told me.

The Mortuary: Pull the lever, climb out and go North to the mortuary entrance. Examine the lights.

The first three colours are your coffin code. The last three are nulls which display your sequence of button pressing. Press the buttons corresponding to the first three colours.

Go back South and climb on to the coffin and up again through the trapdoor. Wait until the clanking fades away. Go North, open the door and leave your mortuary.

Go East to the elevator and enter it. (You score 100 points for doing all this).

The Torus Disks: From the elevator go down to the bottom of the shaft and take the toolbox. (This and the tray help you carry more objects – test if new things will insert into them).

Go up through the elevator and into the winch room. Take the spanner from the toolbox and open the trapdoor. Go through it and then go South until you reach the airlock.

Alternatively press the black button in the elevator. Go up from the toroidal walkway beside the ramp and go South, until you reach the airlock.

Press the yellow button (which allows you to continue in the same direction – the green button opens the door that you just came through) and go South. The spanner is not needed any more. (50 points for this section).

The Freezer Control Area: Go to the massage parlour, sit and wait and stand (50) and go to the storeroom. Take the stacker lift and the scalpel and insert the scalpel into the toolbox.

Go to the Smooth Simrock and wait for the droid to go down the cyladder. Follow quickly.

Enter the Archive, take the mempak and insert it into the video viewer on top of the table.

To be continued . . .

ADFS Menu

Basic bouillon

★ ★ ★

Bytes Bourguignonne

★ ★ ★

And a sweet way round your hierarchical filing system

By JOHN McCRAE

IF you have just received your Master you will be aware that the ADFS is a flexible system with what is called a hierarchical filing structure.

One of its advantages is that the number of filenames is only limited by the disc capacity. It is also possible to create directories within directories, which can provide logical access to data by following the paths outward from the root directory $.

However this facility creates its own problems in that it is impossible to see all the files on the disc when you type *CAT. In ADFS all you get is the contents of the current directory as set by *DIR. It is then necessary to type *DIR followed by the path you want, then *CAT to see what is there.

With ADFS Acorn provides a utility to produce a list of all the files on the disc, but you still need to type the full pathname to run the program after you have found the directory in which it lies.

ADFS Menu is designed to be booted from the root directory ($) of a disc. This presents a standard screen which contains the disc title and the directory path that has been followed to produce the list of filenames, directories and the current drive number.

There is also a list of filenames, directories and an identifying letter, and information on the choices now available.

Filenames are displayed in black and directories in blue. Should the pathname become too long it will scroll in its own window at the top of the screen. The choices available when a list of filenames are displayed are as follows:

- A Basic program may be chained by simply pressing its letter as displayed. If a program is not Basic it will tell you, and then it is a simple matter to exit and *RUN it or whatever.
- You may exit to the current directory displayed by pressing *. This saves typing the long pathnames required to get to some directories.
- You may continue to the first directory which is displayed and hence through all the different paths formed on the disc. This is done by pressing Tab, which will show path by path and directory by directory all the files on the disc, providing the same options in each directory reached.
- You may also specify a path to be followed if for example you want to enter a specific path where you know a set of files are. This is done by pressing the letter appropriate to the directory on the display.
- You can switch between disc drives by pressing 0 or 1 to allow examination of other discs without the need to swap over discs. This option mounts the appropriate disc and can therefore also be used to return to the root directory.

The program allows you to examine the available paths and programs on the disc and to chain programs or exit to the displayed directory without the need to set it manually by typing the full pathname and then *CATing to find a program.

The ability of the ADFS to have unlimited filenames sounds wonderful at first, and there is no doubt that the ability to have a filename of 10 characters in length is much more useful than the single density DFS.

There are however disadvantages in that the hierarchical structure can lead to confusion and apparently lost programs if they are saved into the wrong directory unknowingly.

It is therefore crucial to save programs logically and by specifying the full pathname which is required – for example, :0.$.BASIC.EXPERIMENT. filename – when you are using a disc for more than one purpose.

You may wish to go to the extent of creating a directory specifically for the program on which you are working so that you can save all the versions – at least up to 47 – and have them visible in the directory when you *CAT.

The problem of the pathlength and typing it in can be solved by programming a function key to do it for you. When developing ADFS Menu I used something like this after creating the directory :0.$.BASIC. EXPERIMENT.MENU .

```
*KEY 0 SAVE ":0.$.BASIC.EXPERIMENT.ME
NU.version
```

then all that is required is to type the number and add a " to finish the line – it

PROGRAM STRUCTURE

60	Uses FNos to get operating system version and sets Mode 1 if OS is not 2 or above.
100	Sets *base%* to the base of the ram copy of the catalog.
130	Point to error trap.
140	Set up screen.
180	Main loop.
210-240	Exit.
260-1800	Procedures and functions.

PROCEDURES

screen	Sets up screen and prints title.
read_dir	Main recursive procedure to read and display.
decision	Inputs the choice and performs it.
getname	Gets specified name and whether it's Basic or a directory.
title	Gets title of the current directory.
error	Traps common errors.
oscli	Basic I equivalent of OSCLI (for completeness).

FUNCTIONS

name	Constructs filename by calling FNc.
c	Gets character from memory.
get_path	Gets *path$* for use in recursion and *DIR commands.
os	Gets operating system number.

VARIABLES

B%	Contains Basic file execution address.
C%	Flag to indicate that file is to be chained.
D%	General.
E%	General.
F%	Used to set drive number.
J%	Local to PROCread_dir, counts number of files/directories in current directory.
K%	Selected file number.
S%	Counter to split *A$*.
base%	Base address of ram copy of catalog.
dir%	Flag to indicate directory.
point%	Pointer to directory data in memory. Local to PROCread_dir.
pt%	Local value of *point%*.
A$,B$	General.
$name%	Contains file/directory name.
path$	Contains path of directories.
dir$	Contains current directory/directories to be found.

will certainly get you out of the habit of pressing Control + Break when things do not go according to plan.

You could, of course, just use *DIR - path – then SAVE "versionX" for all subsequent versions.

It is also possible to use *TITLE on each directory which allows you to enter a description of up to 19 letters – this is displayed by ADFS Menu and is useful as a quick résumé of the purpose of the directory,

The ADFS stores the directories as files on the disc with bit 7 of the fourth letter of the name set to identify it as a directory – type *DUMP $ to look at the structure of $.

It is possible to restrict access to the files in any directory by using the *ACCESS command with a combination of W, L or R. You can also have any combination of read protect, write protect and the standard DFS locking on any file.

There is also the E protection mechanism which allows the file to be made execute only. It also seems difficult to remove. This is indicated by bit 7 of the appropriate letter of the filename being set.

The first filename begins at the fifth character of the file and the following information contains the usual load and execution addresses and also the location and length of the file.

The total length of a file's information is 26 bytes. A copy of the current directory is held in ram at &C400 on the Master series and it is on this memory that the program acts. Users of the ADFS on the B or B+ will find it at &1200.

Type in the program as listed. Save the program in the rest, $, directory of an ADFS disc, and before running it delete line 130 so that errors will be reported normally.

The program has many REMs which I would advise you to leave in as they are useful for explanation and the help you find typing errors. When working type:

```
*BUILD !BOOT
*BASIC
F%=0
CHAIN "ADFSMENU"
(press Escape)
```

Now enter:

```
*OPT 4 3
```

which will cause the !BOOT file to be *EXECed when Shift + Break is pressed. The program can handle pathlengths of up to 20 directories on the Master with PAGE at &E00 – this will be reduced by the amount of memory available on the B and B+.

It is not really a limitation as this length of path is fairly inefficient in its use of disc space. There is no limit to the number of paths that can be handled by the program.

→

From Page 59

```
   10 REM ADFS Disc Menu
   20 REM By JRA Macrae
   30 REM (c) The Micro User
   40 REM Read OS version
   50 REM and set mode accordingly
   60 IFFNos<2 MODE1 ELSE MODE129
   70 REM Set base for Catalogue info
   80 REM If os<3 not a MASTER
   90 REM or it's DFS CTRL-Z mode
  100 IFFNos<3 base%=&1200+5 ELSE bas
e%=&C400+5
  110 REM Enter error trap
  120 REM Omit line 130 until debugge
d
  130 ONERRORPROCerror
  140 PROCscreen
  150 DIMname%20,s%&100
  160 REM ROOT DIR IS ALWAYS $
  170 root$="$"
  180 REM Enter main loop
  190 PROCread_dir("",root$)
  200 VDU7,12:PRINT"No More Paths to
go :-"''"TAB for menu"''"RETURN to Ex
it"
  210 E%=GET:IFE%=9 RUN
  220 IFE%=13 VDU26,12:CLG:END
  230 GOTO200
  240 END
  250 :
  260 REM Main procedure recursive
  270 DEF PROCread_dir(path$,dir$)
  280 LOCAL point%,J%
  290 REM Get pathname,split & displa
y
  300 A$=STR$(F%)+"."+FNget_path(path
$,dir$)
  310 S%=1
  320 REM path window
  330 VDU28,2,7,37,3,12
  340 IFLENA$<37PRINTA$:GOTO410
  350 REPEAT
  360 PRINTMID$(A$,S%,INSTR(A$,".",27
+S%)-S%)
  370 S%=INSTR(A$,".",S%+27)
  380 UNTILS%>=LEN(A$) OR S%=0
  390 :
  400 REM Main window
  410 VDU28,1,30,38,13,12
  420 REM Select directory
  430 PROCoscli("DIR :"+STR$(F%)+"."+
FNget_path(path$,dir$))
  440 PROCtitle
  450 REM Directory info starts at ba
se%
  460 point%=base%
  470 REM If no filenames exit
  480 IF ?point%=0 PRINTTAB(2,1)"Dire
ctory empty":GOTO680
  490 REPEAT
  500 point%=base%+26*J%
  510 REM Get name starting at point%
  520 $name%=FNname(point%)
  530 REM Now print it with a referen
ce
  540 REM letter
  550 PRINTTAB(J%DIV16+13,J%MOD16+1);
  560 COLOUR2
  570 IFJ%>25PRINT;CHR$(J%+71);:GOTO5
90
  580 PRINT;CHR$(J%+65);
  590 COLOUR3
  600 REM If its a dir make it blue
  610 IF?(point%+3)>128COLOUR 1:PRINT
" ";$name%:COLOUR3:GOTO630
  620 PRINT" ";$name%
  630 J%=J%+1
  640 REM Adjust point% to see if the
re
  650 REM is another name
  660 point%=base%+26*J%
  670 UNTIL?point%=0
  680 PROCdecision
  690 REM If TAB pressed get next dir
ectory
  700 IFD%=9 J%=0:GOTO800
  710 REM If a specified path
  720 IFdir% J%=K%-1:GOTO800
  730 REM If a Basic file chain it
  740 IFC%VDU26,12:CLG: CHAIN $name%
  750 REM If not BASIC file flag erro

  760 REM and ask what to do
  770 VDU7:PRINTTAB(0,17)"Can't Chain
 this - Press a Key";:E%=GET:PRINTTAB
(0,17)STRING$(35," ");:GOTO680
  780 REM Get either specified dir
  790 REM or next one
  800 REPEAT
  810 point%=base%+26*J%
  820 IF ?(point%+3)<128GOTO890
  830 $name%=FNname(point%)
  840 REM Now look into the dir
  850 PROCread_dir(FNget_path(path$,d
ir$) , $name%):dir%=0
  860 REM Now get back to the dir tha
t we
  870 REM were in before 830
  880 PROCoscli("DIR "+FNget_path(pat
h$,dir$))
  890 J%=J%+1
  900 REM adjust point% to next name
  910 point%=base%+26*J%
  920 UNTIL?point%=0
  930 ENDPROC
  940 REM Gives path name allowing fo
r
  950 REM root directory with nul pat
h
  960 DEF FNget_path(A$,B$) IF A$<>""
 THEN = A$+"."+B$ ELSE = B$
  970 REM Gets filename or dirname
  980 DEFFNname(point%) =FNc(point%)+
FNc(point%+1)+FNc(point%+2)+FNc(point
%+3)+FNc(point%+4)+FNc(point%+5)+FNc(
point%+6)+FNc(point%+7)+FNc(point%+8)
+FNc(point%+9)
  990 REM Get character from memory
 1000 DEFFNc(pt%) =CHR$(?pt% AND &7F)
 1010 REM Gives pathname
 1020 REM Input routine
 1030 DEFPROCdecision
 1040 K%=0
 1050 *FX21,0
 1060 D%=GET
 1070 IFD%=9 ENDPROC
 1080 IFD%=48 F%=0:RUN
 1090 IFD%=49 F%=1:RUN
 1100 IFD%=42 VDU26,12:CLG:END
```

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```
 1110 IFD%<65GOTO1160
 1120 IFD%>90 IFD%<97 GOTO1160
 1130 IFD%>64 IFD%<91 K%=D%-64
 1140 IFD%>96 IFD%<123 K%=D%-70
 1150 IFK%<J%+1PROCgetname:ENDPROC
 1160 VDU7:GOTO1050:ENDPROC
 1170 REM Checks whether specified fi
le
 1180 REM is BASIC or a directory
 1190 DEFPROCgetname
 1200 dir%=FALSE
 1210 point%=base%+(K%-1)*26
 1220 $name%=FNname(point%)
 1230 IF ?(point%+3)>128 dir%=TRUE
 1240 B%=?(point%+15)*&100+?(point%+1
4)
 1250 C%=FALSE
 1260 IFB%=&802B C%=TRUE:ENDPROC:REMB
as4
 1270 IFB%=&8023 C%=TRUE:ENDPROC:REMB
as2
 1280 IFB%=&801F C%=TRUE:ENDPROC:REMB
as1
```

```
 1290 ENDPROC
 1300 REM Setup Screen
 1310 DEFPROCscreen
 1320 VDU19,0,7,0,0,0
 1330 VDU19,3,0,0,0,0
 1340 VDU19,1,4,0,0,0
 1350 VDU19,2,1,0,0,0
 1360 GCOL0,129
 1370 MOVE0,0:PLOT 103,1279,1023
 1380 COLOUR0:COLOUR129:PRINTTAB(5,9)
"A to z to select Prog/Path"
 1390 PRINTTAB(5,10)"TAB for next dir
ectory"
 1400 PRINTTAB(5,11)"* to exit";SPC(5
);"0/1 to mount"
 1410 COLOUR128
 1420 COLOUR 3
 1430 VDU28,2,7,37,3,12
 1440 VDU28,1,30,38,13,12
 1450 VDU23;8202;0;0;0;
 1460 ENDPROC
 1470 REM Get title and print it
 1480 DEFPROCtitle
 1490 VDU26
 1500 COLOUR0:COLOUR129
 1510 point%=base%+&4D4
 1520 $name%=FNname(point%)
 1530 point%=base%+&4DE
 1540 $name%=$name%+FNname(point%)
 1550 $name%=LEFT$($name%,19)
 1560 PRINTTAB(5,1)STRING$(27," ")
 1570 PRINTTAB(5,1)"TITLE:- ";$name%
 1580 VDU28,1,30,38,13
 1590 COLOUR128:COLOUR3
 1600 ENDPROC
 1610 REM Trap common errors
 1620 DEFPROCerror
 1630 VDU28,1,30,38,13,12
 1640 IFERR=44PRINT"Too Many levels o
f Recursion":PRINT'"More than 20 leve
ls of "'"directory is not really very
 efficient":GOTO1690
 1650 IFERR=199PRINT"Disc error."'"Is
 it formatted for ADFS?":GOTO1690
 1660 IFERR=200PRINT"Disc changed.":G
OTO1690
 1670 IFERR=214PRINT"Not found.":GOTO
1690
 1680 REPORT:PRINT" at line ";ERL
 1690 PRINT'"Press SPACE to restart"
 1700 *FX21,0
 1710 REPEAT:E%=GET:UNTILE%=32
 1720 ENDPROC
 1730 REM Get operating system versio
n
 1740 DEFFNos
 1750 X%=&FF:A%=0
 1760 =(USR(&FFF4) AND &FF00)DIV &100
 1770 DEFPROCoscli($s%)
 1780 X%=s%MOD&100:Y%=s%DIV&100
 1790 CALL&FFF7
 1800 ENDPROC
```

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African pastime sows the seeds of skill and chance

By DANIEL BISHOP

AYO is a computerised version of a traditional African board game, Mancala, involving a lot of skill and just a little luck too. You may play it with a friend or against the computer. The latter is guaranteed to give you a hard game.

The game is traditionally played on a long wooden board, into which two rows of six cup-like hollows are carved. These are referred to as houses.

In addition there are usually two large score houses, at opposite ends of the board. Often these boards are highly decoratively carved.

They also may be hinged, as are many Egyptian and Asian game boards, so that the board may be closed like a box when not is use. The counters used in Ayo are traditionally seeds of the plant Caesalpinia crista which grows in West Africa.

When you run the program the screen display will show you a plan view of the Ayo board.

There are two rows of six houses and in addition two score houses, one at either end of the board. The first player plays with the lower row, and the second with the upper row.

The score house on the right belongs to the first player and the one on the left to the second player.

The second player may be the computer if you wish. When you first run the program the computer player will be "on". Pressing C will toggle between on and off as required.

At the start of the game four counters, or seeds, will be placed in each house. The score houses will be empty.

Note that the seeds may be placed on top of each other, so that it is sometimes difficult to tell exactly how many seeds there are in a house. This is intentional.

One of the rules of real Ayo is that the seeds may never be counted properly. The players may only look and guesstimate the number of seeds in a house, so it is possible to misjudge the number and play a bad move. This is where an aspect of luck comes in.

When the message "Start game" appears briefly in the centre of the Ayo board a bell-like sound rings and the first player may begin.

Note the panels below the first player's score house and above the second player's score house. An asterisk in the panel means that it is that player's turn. The letter C in the top panel means that the computer is playing as the second player.

The digits refer to the cumulative number of seeds captured by each player in previous games. Thus at the start the digit in each score panel is 0. This will change at the end of the first game, or the beginning of the second, and at the beginning of every successive game.

You may do one of five things during your turn, one of which is to actually make your move. The remaining four are:

Press I to read the brief instructions on play. You will be returned to the

EXAMPLE SITUATION

THIS example should help you to gain a clearer understanding of the methods of sowing and eating seeds. If while playing Ayo you cannot decide what the outcome of a particular move should be, study this example, since it covers most of the common situations.

Look at the stylised diagram of an Ayo board. Note that the score houses are not shown, since they are not important in this discussion.

I will refer to the first player as A and the second player as B. Also I will call A's houses A.1, A.2 and so on and B's houses B.1, B.2 and so on. In this situation part-way through a game each player has a number of optional moves.

Presuming it is A's turn, he has a choice of six moves since all of his houses have seeds in them. They will have the following outcomes:

1) No seeds eaten.
2) No seeds eaten.
3) Two seeds eaten from B.1, three seeds eaten from B.2 and two seeds eaten from B.4.
4) No seeds eaten.
5) No seeds eaten.
6) Two seeds eaten from B.4.

If it was B's turn, he would have the choice of only five moves since B.3 is empty. His moves would have the following outcomes:

1) Two seeds eaten from A.1.
2) Two seeds eaten from A.1.
4) No seeds eaten.
5) No seeds eaten.
6) Three seeds eaten from A.4.

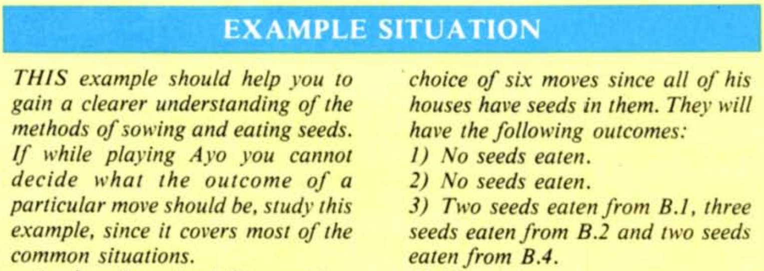
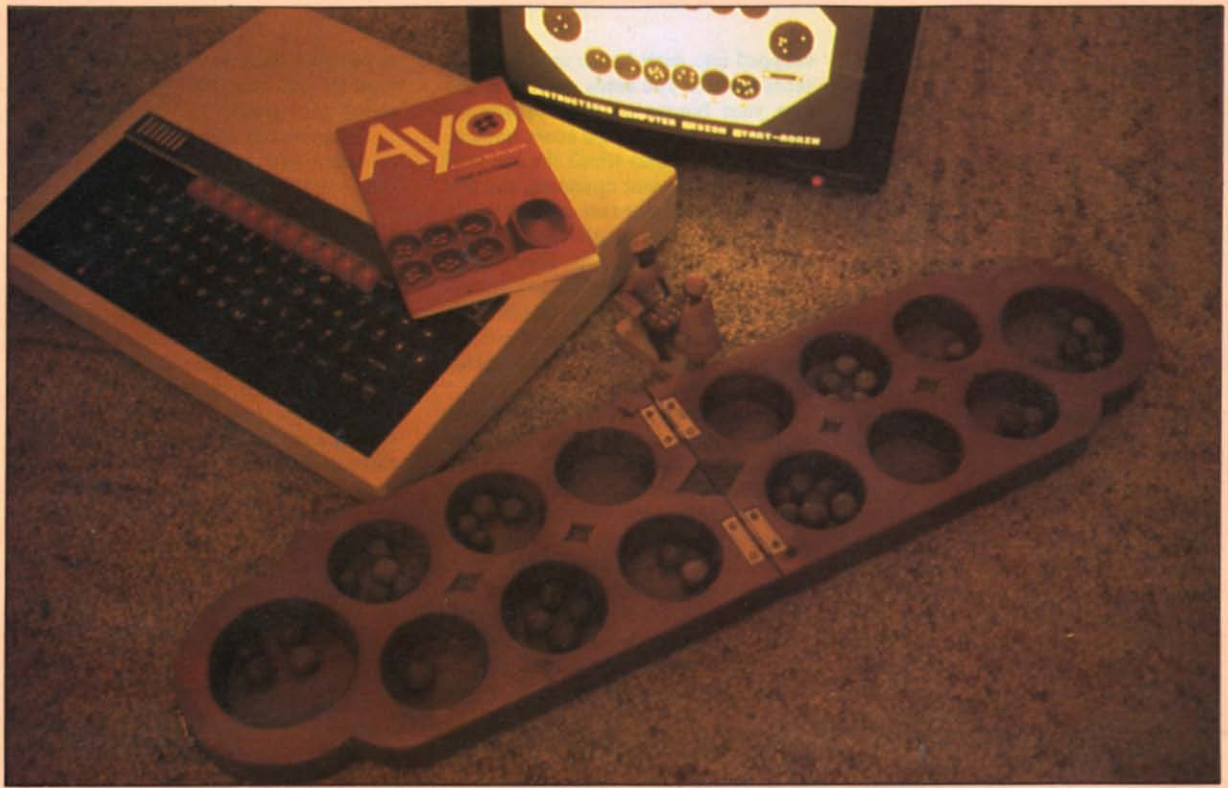


Diagram 1



Ancient and modern . . . carved Nigerian figures sit between the traditional board and the micro version of Ayo

PROGRAM STRUCTURE

10-30	REMarks.
40-360	Once only initialisation.
370	Draws screen display.
380	Initialisation.
390-410	Every game initialisation.
420	Prints score panels.
430-510	Get player's response.
520-600	Move a house.
610-670	Eat from houses.
680-770	End of turn or end of game?

PROCEDURES

screendisplay	Draws screen display.
emptyhouses	Clears all seeds from the board.
fillhouses	Puts seeds in all houses.
drawhouse	Draws a black disc at the position specified.
scorepanels	Prints scores.
seed	Plots a seed in specified house.
scrunch	Sound effect.
tok	Sound effect.
pause	Delay routine.
bell	Sound effect.
instructions	Paged instructions on how to play.
wait	Prompts you to press a key and waits until you do so.

VARIABLES

HP%(5)	Relative merit points given to houses in computer move routine.
H%(1,5)	Number of seeds in each house.
HT%(1,5)	Number of seeds in each house – trial arrangements in computer move routine.
HXY%(1,5,1)	Graphics coordinates of house centres.
TXY%(1,1)	Coordinates of panels.
SCORE%(1)	Players' scores.
SXY%(1,1)	Graphics coordinates of score house centres.
SEED%(1)	Number of seeds in each score house.
HNUM%(1,5,1)	Graphics coordinates of house numbers.
RH%	Radius of house.
RSH%	Radius of score house.
MESX%	X coordinate of message panel.
MESY%	Y coordinate of message panel.
COMP%	Is computer playing? (–1=yes, 0=no).
BOARD%	Is board OK? (–1=yes, 0=no).
TURN%	Number of player whose turn it is.
USER$	Player's response.
HOUSE%	House being moved.
TM	Length of pause.

→

From Page 63

game afterwards and you will not forefeit your turn.

Press C to turn the computer on or off. Note that if it is the first player's turn and the computer is turned on, it will not play until it is the second player's turn. If it is the second player's turn the computer will start playing its move immediately.

Press R to resign from the game in progress. All the remaining seeds on the board, but not those in your score house, are forfeited to your opponent. A new game is then started.

Press S to stop the current game. A new game is started and the scores are reset to zero.

The houses on both sides are numbered. Pressing any number between 1 and 6 moves the contents of a house on your side. You will see the seeds removed from the chosen house and distributed around the other houses in an anticlockwise manner. One seed is dropped into each house until no more seeds are left. The seeds may be sowed into your houses or your opponent's houses, but not into the score houses.

If the house into which the last seed falls belongs to your opponent, and that house then contains two or three seeds, those seeds are captured – "eaten" is the preferred term – by you. They will be removed from play and placed in your score house. Note that, as in real Ayo, the eaten seeds are not counted until the end of the game, so your score will not change straight away.

Furthermore any preceding houses which belong to your opponent and which now contain two or three seeds will also be eaten, providing that any intervening houses contain no more than three seeds.

This may sound confusing at first so try playing against the computer and see how it goes. This should help you understand the rules. But don't worry, they will soon become second nature.

The object is to eat as many of your opponent's seeds as you can. Also you must try and stop your opponent from eating your seeds.

Thus you can play both aggressively or defensively. How you play is up to you – this is the skill of Ayo.

The game will end of its own accord eventually, even if you do not press R or S. This happens if either player begins his turn with no seeds to move, or both players have less than two seeds each.

If the game ends in either of these ways the seeds left on the board are not counted towards either player's score.

When the game ends the message "Game over" will appear briefly and the bell will ring. The board will be cleared, including the score houses. The seeds are redistributed around the board, four in each house and a new game begins. The scores in the score panels are now updated.

Full listing starts on Page 136

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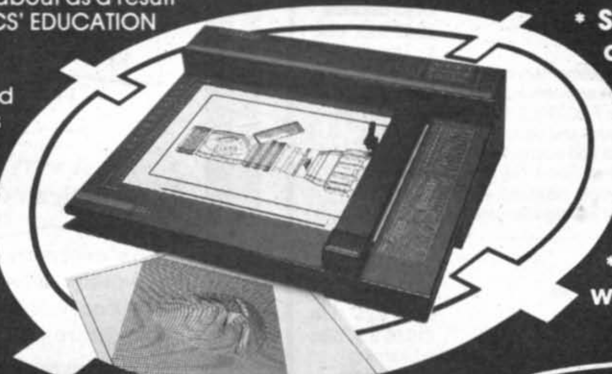

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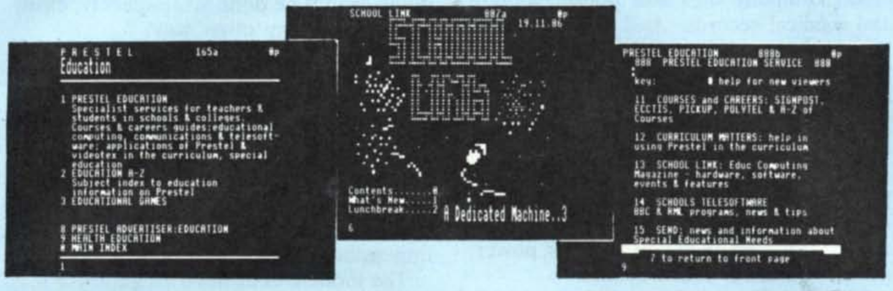

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P R E S T E L          165a        0p
Education
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1 PRESTEL EDUCATION
  Specialist services for teachers &
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  Courses & careers guides:educational
  computing, communications & telesoft-
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2 EDUCATION A-Z
  Subject index to education
  information on Prestel
3 EDUCATIONAL GAMES

8 PRESTEL ADVERTISER:EDUCATION
9 HEALTH EDUCATION
# MAIN INDEX
_____________________________________
1
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SCHOOL LINK                  887a        0p
                                   19.11.86
      SCHOOL
       LINK

Contents.......0
What's New.....1
Lunchbreak.....2 A Dedicated Machine..3
6
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PRESTEL EDUCATION        888b        0p
 888  PRESTEL EDUCATION SERVICE  888

 key:            # help for new viewers

 11  COURSES and CAREERS: SIGNPOST,
 ECCTIS, PICKUP, POLYTEL & A-Z of
 Courses

 12  CURRICULUM MATTERS: help in
 using Prestel in the curriculum

 13  SCHOOL LINK: Educ Computing
 Magazine - hardware, software,
 events & features

 14  SCHOOLS TELESOFTWARE
 BBC & RML programs, news & tips

 15  SEND: news and information about
 Special Educational Needs
_____________________________________
     7 to return to front page
9
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Information = power

Judith Askey examines the question of the value of schools modems

SPECULATION about the value of the modem in schools is rife at the moment. A variety of hardware and software has now been thrown at the feet of teachers and librarians who are expected to use it wisely and effectively – without prior experience or help.

The DTI modem offer could be just another burden on teachers. They have enough to learn without adding modems and remote access databases. And TTNS, Prestel, MicroLink, Dialog and a proliferation of local databases. And possibly Minitel, Viatel and Teletel in the future. And . . .

However, despite doubts expressed by many on the educational value of modems and online systems, there are those who know how these systems should be used in the curriculum.

Prestel has been available to schools for some time now and a body of knowledge and experience has built up. We now know the answers to a number of questions:

- Where should it be located and who should manage it? – The library and teacher/librarian.
- Who should bear the burden of costs? – As a whole school resource it should be shared between faculty/departmental capitations.
- Is it an administrative tool or curriculum resource? – Both, with the greatest use and value on the curriculum.
- Will it provide information on Henry VIII, the bumble bee and polymers? – Let me ask you, have you ever found one source of information which will provide all that? And if you have, would you accept that as the only authoritative and accurate source?

Nevertheless, I can tell you that it has information related to several curriculum areas. No, not much on history. Why? Because it is a commercial medium designed to provide volatile information that can be frequently updated.

The best way to use it is in conjunction with other sources. Variety is the spice of life and it makes lessons interesting.

So if it is not a magic box after all why use it? The most important question, and one that few people ask or consider in depth is: "What are the learning benefits?"

I would ask you to forget the blurb about the technological age and the need to learn how to use computers. Think instead about the process children go through when using electronic communications and information systems such as Prestel and other viewdata networks.

Why use communications and informations systems? As already pointed out,

→

Percy goes public

SOFTWARE developed for the world's first computerised college prospectus is now being made available to other educational establishments.

The authoring version of Percy – a BBC Micro package developed by two tutors at the Percival Whitley College of Further Education, Halifax – is already finding a ready market elsewhere in the country.

It is being used by colleges in Huddersfield, Sheffield, Macclesfield and Neath to provide local secondary schools with a simple database of the courses they offer.

And the Manpower Services Commission has bought the product to promote YTS opportunities in Calderdale, Bradford and Kirklees.

The British Council has also requested copies for its offices around the world, particularly in the Far East, where it runs courses for foreign students.

The original version of Percy was written by John Rockett and David Hull and launched in October.

Rockett, manager of the College science and humanities group, and Hull, a social care tutor, developed a prospectus aimed at mainly non-computerate people who needed course and careers information.

A copy has gone to every secondary school in the 180,000-population Calderdale area where the College is situated.

"Percy is not a major database to enable you to find out how many courses have 'banana' in their title or more than 2.79 tutors per square

→

inch", Rockett told *Education Micro User*.

"It is intended as a means to inform and broaden users' perspectives.

"We know from long experience that most potential students have well-defined areas of interest, but find the plethora of names and initials in further education most confusing.

"Percy guides users to all the courses within their area of interest, enabling them to make better informed choices and stand a better chance of finding the right course for them.

"The package is deliberately aimed at the simplest micro set-up – a BBC Micro with 40 track drive – to ensure it will work on the standard kit found in almost all secondary schools and other relevant establishments such as careers offices.

"The authoring package enables others to create their own versions of Percy.

Schools and colleges can buy it for £58 for use within their confines, area education authorities for £150 and companies for £350.

"The Mk 1 version is committed to being a prospectus, but we are making the necessary adjustments to the screen and paper messages to enable it to be used to create any form of Percy.

"One exciting application we are developing with social care students is a guide to welfare services.

"On this version, for example, the heading Housing may point the user to seven sources of help rather than the only one they have heard of previously – so increasing the chances of satisfaction".

Modelling techniques

NEW from Teacher's Software is 3D Cad-Cube, a three dimensional solid modelling program with full colour, said to be the first of its kind for the BBC Micro.

Using specially developed machine code routines to provide fast drawing and deleting techniques, it enables pupils to create shapes in an isometric environment.

It also allows shapes to be

From Page 67

they provide a source of up-to-date information. And over the last two decades at least developments in information technology have increased the speed with which information can be processed, stored, located, accessed, retrieved and used.

The same period has seen the development of thousands of local, national and international databanks on as many topics, many requiring different search strategies and skills to use them.

Among other things, databases hold credit company files and police, welfare and medical records. And they serve the business and domestic information market. The person who is aware of their existence, applications and infallibility is less likely to be exploited through their use.

We need to equip young people to use these systems to their advantage. Knowledge is no longer power: The ability to get the information that you need is power, power to control your own life.

What skills are learnt? Information skills. The process through which children go in accessing these databases, in locating and manipulating the information according to their needs is fundmental to the GCSE and primary curriculum.

In using online services the child is no longer the passive recipient of information. He or she is able to rewrite it to become the author, editor, illustrator and user.

Language skills are also learnt and are one of the most important features of online education. Young children learn to read and write in the early years through the medium of environmental information, which exists all around us – signs in shops, advertisements, posters in the doctors and so on.

Prestel is an example of this environmental language which can be used in the development of reading for information. Its various databases are couched in different language registers, from abbreviated language to full text discursive writing.

Writing for different meanings and audiences can be developed. If you think the information on Prestel is presented badly get the children to rewrite it. Can you do the same with that printed leaflet on dental care with a reading age of 21?

Observe children when they are using Prestel and viewdata. You will find they discuss the information, evaluate it, use each other as resources, argue, and substantiate and illustrate their points.

Children accept criticism of their work more readily because of the ability to wipe out all evidence of error. They are able to rewrite and refine their work, presenting a finished product in which they can feel confident.

The GCSE English criteria suggest the development of the four language modes in one integrated project. Children employ all four when engaged in a Prestel project, though few people recognise this and build on it.

What of the communications? Why not use the telephone? It's not redundant and it is important that children should be confident and competent.

Resistance to new technology is nothing new – it was decades before the phone was accepted.

If you are going to use electronic communication be sure you are doing it for the right reasons, and that what you are doing cannot be done more quickly, easily and cheaply any other way.

And don't forget motivation. The Cockcroft Report identifies the need for continual re-inforcement in mathematics. To avoid death by worksheet, practical projects using the technology can take much of the tedium out of constant repetition. It offers another dimension and one that is attractive, dynamic and three dimensional itself.

The modem does have a significant role to play in the learning process. It provides access to sources of curriculum information, a medium of learning information skills, social, technical and vocational skills.

How can it help teachers? Again it provides access to sources of information for use in course design and of a professional nature. The Prestel Education Database provides valuable information for the teacher, either in the classroom or in course design and is made up of a variety of useful databases. The Curriculum Matters section went online on June 1 1986 and provides curriculum guidance.

The School Link section is also a source of classroom material. Both these sections have been designed on the basis of feedback by teachers and librarians who have used Prestel in the curriculum.

When considering the application of such systems in the curriculum we need to ask several questions. The fundamental one is: "What are the skills I want the children to learn in this course?" The next step is to seek out the most appropriate resources and to consider how they can be used to develop those skills.

Many people start from the resource and try to create a course around it. Consequently they get a course to which they fit learning objectives, ending up with the answer to a problem which earlier did not exist.

Electronic communication and information systems are not complete learning packages on their own. They should be used in conjunction with a variety of print and non-print materials.

They offer teachers a flexible learning resource which has implications for teaching and learning styles and it is these which need to be addressed through in-service training. ■

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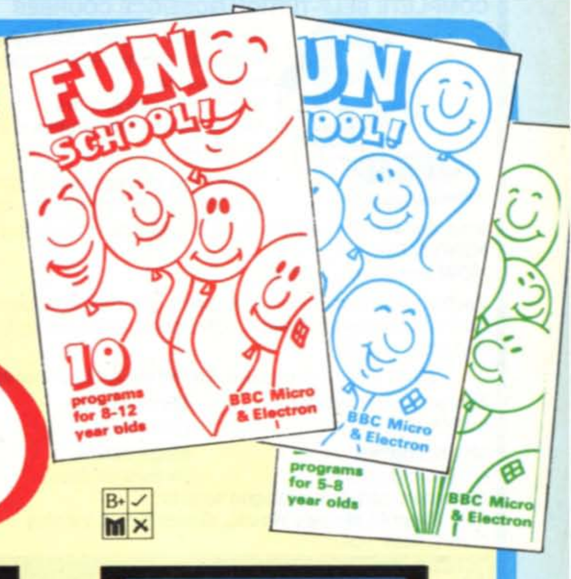
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- Seaside
- Snap

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Ages 5-8

- Balance
- Castle
- Derrick
- Fred's Words
- Hilo
- Maths Test
- Mouser
- Number Signs
- Seawall
- Super Spell

SIGN
QUESTION: 9
WHICH SIGN GOES IN THE BOX?
SCORE:
Test for PETER

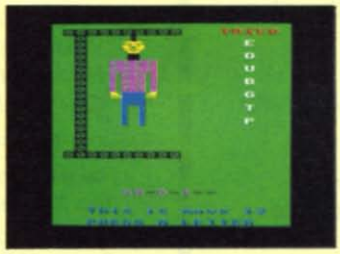
NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten

NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER IS 35+3 =38
PRESS SPACE
37
35+3

BALANCE
Learn maths the fun way. Type in the answer to balance the scales

Ages 8-12

- Anagram
- Codebreaker
- Dog Duck Corn
- Guessing
- Hangman
- Maths Hike
- Nim
- Odd Man Out
- Pelmanism
- Towers of Hanoi



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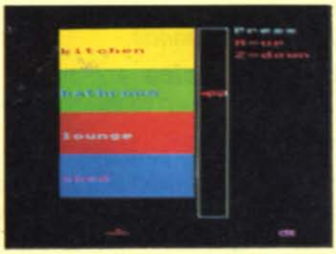
kitchen
bathroom
lounge
shed
Press
8=up
2=down

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Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 167

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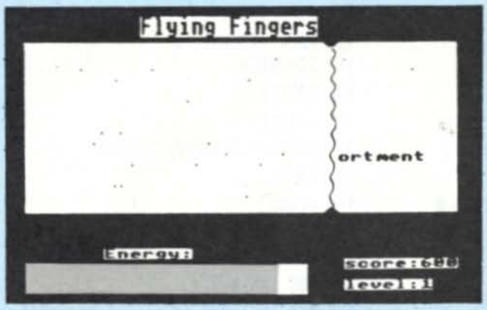

Ray Smit introduces Flying Fingers an arcade game that takes the tedium out of typing practice

CONVENTIONAL typing tutors can be very effective – but they can also be quite tedious. Entering line after line of meaningless phrases must have spawned the saying "All work and no play makes Jack a dull boy".

But with Flying Fingers you should be able to learn fast typing and at the same time enjoy the excitement of an arcade game.

In 1972 a crack commando team was sent to military prison for a crime they didn't commit. They escaped and today are now operating on their own. If you have a problem and nobody else can help then maybe, if you can find them, you can hire The FF Team.

It is at present on a mission from the government. Two days ago a new satellite was launched from Cape Kennedy. Due to a fault in the main computer it started to transmit secret information at an extremely slow rate. By quick typing, the FF Team must destroy this information before the Russians get it because if they do they will be able to shut down the American protection shield.

You control the FF Team from the keyboard. As soon as one of the words transmitted by the satellite comes into view type it before the Russians pick it up with their laserbeam. If you are not fast enough and the word, or part of it, reaches the laserbeam, the energy will be reduced. When it reaches zero the game is over.

Enter your program in the usual way and make sure you save it before you run it.

Some machine code was necessary to move the stars and laser smoothly, but don't be put off by this because the program checks to see that you've typed it correctly.

Take care with labels such as l1 – this is the letter l followed by the number 1. To give sufficient memory the program relocates itself if Page is not at &E00, and you should also save memory by omitting spaces after line numbers.

When you run the program you can either press the spacebar and start the game straight away or press Return and adjust some of the variables that affect the difficulty. Then just type the words as fast as you can.

The game is set up for 100 words in groups of 10. The word presented is selected from 30 of these words, the starting point increasing each time the level increments. So if you are on level 2 your words will be selected from the twenty first to the fiftieth word.

These parameters can be changed easily in line 1090, and the data changed or more data added in lines 1550 to 1640, but remember that if you add too many words you will eventually run out of memory. ■

MAIN VARIABLES

crash	Laserbeam hit
el	Energy level
enx%	Laserbeam position
go	Game over
words	Number of words typed correctly

MAIN PROCEDURES

setup	Sets up screen, machine code and so on
setup2	Sets all variables for new game
go	Game over
nextlevel	Selects next level
str(x,y,T$)	Prints T$ double height at x,y
ass	Assembles machine code

---

speedily reviewed in first and third angle orthographic projection including hidden line detail.

And it also caters for perspective, with the eye position automatically selected from any of the initial four isometric views.

In addition, the six levels of shapes can be seen as lamina to assist more practically minded children who wish to re-create the shapes in tangible materials like wood, clay or building blocks.

All the screen images can be drawn as shaded black and white images on paper using

3D CAD-CUBE
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the Epson screen dump facility that's incorporated into the software.

User-defined shapes can be saved to disc, which has on its reverse a number of predefined shapes for use by the beginner.

An on-screen help facility is provided, as well as a full-screen help page.

The program comes on 40 or 80 track disc. Price: £14.95.

European standard

THE new European education standard micro being developed jointly by Thomson, Olivetti and Acorn for completion this year will use the OS-9/68000 operating system.

And this could mean one of the largest ever applications for an operating system.

So claims Paul Dayan, technical director of The Soft Centre, UK distributor of Microware OS-9.

"Earlier UK experience of school micros indicates the total European sales of the new machine – which will also double as a personal computer – could well be in the millions", Dayan said.

"We expect that a whole

generation of European schoolchildren will become familiar with the features and applications of OS-9 – strongly influencing the adoption of this universal operating system".

The OS-9 is available with powerful development languages and tools, including Microware Basic, Pascal, C and Fortran, plus a growing selection of third-party applications programs.

IT package improvements

A NEW and improved version of the BBC Micro information technology teaching package MicroCodil 1.2 has been released by Codil Language Systems.

MicroCodil 1.21 is being offered to existing users of MicroCodil at a discount of £20.

The author, Dr Chris Reynolds, says various reported bugs in version 1.2 have been corrected and five new system words have been added to help with problem-solving and artificial intelligence applications.

And it is now possible to freeze the main window so that the screen can be read while MicroCodil continues to work.

A full colour editor has been added to the Files program, making it easier to set up and change MicroCodil files.

And the Codil program now checks the computer on which it is loaded for compatibility and loads the appropriate software.

While the default software directory remains the same, it is now possible to use any four character directory name instead.

Parts of the Menu and Expand modules have been altered to ensure wider compatibility across the range of BBC Micros.

Five new knowledge bases, mainly with an historical slant, have been added and improvements made to others. The new ones are Bogbod, Devon, Invent, Price, and Prison.

A number of new problem-solving examples are provided on disc, ranging from simple calculations via the prob-

From Page 71

```
   10 REM Flying Fingers
   20 REM (c) The Micro User
   30 REM Author : Ray Smit
   40 *TAPE
   50 *FX18
   60 *KEY0 FOR I%=0TOTOP-PAGE STEP4:I%!
&0E00=I%!PAGE:NEXT|M PAGE=&0E00|M OLD|M
RUN|F|M
   70 IF PAGE=&0E00 GOTO90 ELSE *FX138,0
,128
   80 END
   90 ONERRORGOTO260
  100 HIMEM=&3000:table=&3162:J%=0
  110 VDU22,7:PROClch:*FX4,1
  120 ENVELOPE1,1,4,-4,4,10,20,10,127,0,
0,-5,30,30
  130 ENVELOPE2,1,4,-4,4,10,20,10,127,0,
0,-5,126,126
  140 *FX13 4
  150 VDU22,1,23,1;0;0;0;0,23;13,80;0;0;
0,23;6,31;0;0;0
  160 PROCass:C%=char1:D%=char2:E%=enx:F
%=remove:CLEAR
  170 table=&3162:char1=C%:char2=D%:enx=
E%:remove=F%
  180 PROCsetup
  190 REPEAT
  200 PROCsetup2
  210 REPEAT
  220 PROCgetword
  230 PROCtyp
  240 UNTILgo:PROCgo
  250 UNTIL0
  260 *FX13 4
  270 *FX12
  280 VDU22,7
  290 IF ERR=17 GOTO110
  300 REPORT:PRINT" at line ";ERL:END
  310 DEFPROCsetup
  320 *FX11
  330 VDU19,3,6;0;19,2,5;0;
  340 FORx=&3280 TO &8000 STEP4:!x=&FFFA
FFFA:NEXT
  350 PROCstr(12,2,"Flying Fingers")
  360 PRINTTAB(9,24)"Energy:"TAB(28,25)"
score:"TAB(28,27)"level:"
  370 VDU26:GCOL0,3:MOVE79,351:MOVE1199,
351:PLOT85,79,895:PLOT85,1199,895:VDU24,
95;367;1183;879;:CLG
  380 GCOL3,3
  390 RESTORE400:FORI%=0 TO &70 STEP4:RE
AD D$:I%!&A00=EVAL("&"+D$):NEXT
  400 DATA11,11000000,11226688,88662211,
11,11000000,22444488,88444422,11,1100000
0,44444488,88444444,0,0,88888888,8888888
8,22222211,11222222,88,88000000,44222211
,11222244,88,88000000,88446611,11664488,
88,88000000,0
  410 ENDPROC
  420 DEFPROCass
  430 FORI%=0TO2STEP2
  440 P%=HIMEM
  450 [OPTI%
  460 .start
  470 PHP:PHA:TXA:PHA:TYA:PHA
  480 LDY#0
  490 .loop
  500 LDA table+1,Y
  510 CLC
  520 ADC table+3,Y
  530 STA ps+1:STA ps2+1:STA ps+7:STA ps
2+7
  540 LDA table,Y
  550 ADC table+2,Y
  560 STA ps+2:STA ps2+2:STA ps+8:STA ps
2+8
  570 .ps LDA &3000
  580 EOR table+4,Y
  590 STA &3000
  600 LDA table+4,Y
  610 CLC:ROR A:STA table+4,Y
  620 BCC over
  630 LDA table+3,Y
  640 CLC:ADC#8:STA table+3,Y:CMP#&20
  650 BNE o1:LDA table+2,Y:CMP#2
  660 BNE o1:LDA#0:STA table+3,Y:LDA#&FF
  670 STA table+2,Y:.o1 LDA table+3,Y
  680 BNE oo2:LDA table+2,Y:TAX:INX:TXA
  690 STA table+2,Y:.oo2
  700 LDA table+1,Y:CLC:ADC table+3,Y:ST
A ps2+1:STA ps2+7:LDA table,Y:ADC table+
2,Y:STA ps2+2:STA ps2+8:LDA#&08
  710 STA table+4,Y
  720 .over
  730 .ps2 LDA &3000:EOR table+4,Y
  740 STA &3000
  750 INY:INY:INY:INY:INY:CPY#100:BEQ ou
t:JMP loop
  760 .out
  770 LDX#2
  780 .s2
  790 LDA char1:STA&70:LDA#&A:STA&71:STA
&73
  800 LDA char2:STA&72
  810 LDA#&38:CLC:ADC enx:STA &74
  820 LDA#&3F:ADC enx+1:STA &75
  830 LDA#&B8:CLC:ADC enx:LDA#&5F:ADC en
x+1:STA&76
  840 .10 LDY#15
  850 .11 LDA (&70),Y:EOR (&74),Y:STA (&
74),Y
  860 DEY:BPL 11
  870 LDA&74:CLC:ADC#&80:STA&74
  880 LDA&75:ADC#&2:STA&75:CMP &76:BEQ i
```

```
nc
 890 LDY#15
 900 .12 LDA (&72),Y:EOR (&74),Y:STA (&
74),Y
 910 DEY:BPL 12:LDA&74:CLC:ADC#&80:STA&
74:LDA&75:ADC#&2:STA&75:CMP&76:BEQ inc:J
MP 10
 920 .inc DEX:BEQ out2
 930 LDA char1+1:BNE o2:LDA char1:SEC:S
BC#&10:STA char1:BNE oo:DEC char1+1:INC
char2+1
 940 .oo LDA char2:CLC:ADC#&10:STA char
2:JMP s2
 950 .o2 LDA char1:CLC:ADC#&10:STA char
1:LDA char2:SEC:SBC#&10:STA char2:BNE j:
DEC char2+1:INC char1+1:.j JMP s2
 960 .out2
 970 PLA:TAY:PLA:TAX:PLA:PLP
```

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```
 980 RTS
 990 .char1:BRK:BRK:.char2:BRK:BRK:.enx
:BRK:BRK
1000 .remove PHP:PHA:TXA:PHA:TYA:PHA:LD
X#1:JMP s2
1010 ]NEXT
1020 ?&220=start MOD 256
1030 ?&221=start DIV 256
1040 chs=0:FORI%=HIMEM TO P%-1:chs=chs+
?I%:NEXT
1050 IF chs<>36254 PRINT'"You made a mi
stake while typing the"'"assembler-code.
":END
1060 ENDPROC
1070 DEFPROCgetword
1080 RESTORE 1550
1090 w1=level*10+J%+RND(30):IFw1>100 w1
=100
1100 FORw=1 TO w1
1110 READ W$
1120 NEXT
1130 ENDPROC
1140 DEFPROCtyp
1150 *FX21 4
1160 d=1:w$=LEFT$(W$,d)
1170 X=1168-(enx%+1)*32+dec:BX=X:Y=RND(
416)+64:PROCmove(X,Y,w$)
1180 REPEAT
1190 IF X<BX-32 d=d+1:w$=LEFT$(W$,d):BX
=BX-32
1200 PROCmove(X,Y,w$)
1210 X=X-dec:PROCmove(X,Y,w$)
1220 I$=INKEY$(0)
1230 IF I$=LEFT$(W$,1) OR I$=CHR$(ASC(L
EFT$(W$,1)) AND &DF) THEN MOVEX,Y:PRINTL
EFT$(W$,1):W$=RIGHT$(W$,LEN(W$)-1):w$=RI
GHT$(w$,LEN(w$)-1):X=X+32:BX=BX+32:d=d-1
:score=score+10:VDU4:PRINTTAB(34,25);STR
$(score):VDU5:SOUND1,-10,ASC(I$)+50,1
1240 UNTILW$="" OR X<0
1250 IF X<0 PROCcrash
1260 IF w$="" words=words+1:IF words=10
PROCnextlevel
1270 ENDPROC
1280 DEFPROCcrash
1290 W%=LEN(W$)
1300 REPEAT
1310 x1=X:REPEAT
1320 PROCmove(X,Y,w$):X=X-dec:IF X<BX-3
2 d=d+1:w$=LEFT$(W$,d):BX=BX-32
1330 PROCmove(X,Y,w$)
1340 UNTILX<x1-31
1350 SOUND1,0,RND(100)+100,0:SOUND0,-10
,7,15
1360 VDU29,0;0;24,80;116;800;220:
1370 GCOL0,0:MOVEel+80,116:MOVEel+80,20
4:PLOT85,el+44,116:PLOT85,el+44,204
1380 el=el-36:VDU24,(enx%+1)*32+12;367;
1183;879;29,(enx%+1)*32+12;367;
1390 W%=W%-1:UNTILW%=0
1400 IFel<1 go=-1
1410 ENDPROC
1420 DEFPROCstr(x,y,T$)
1430 VDU4,31,x,y
1440 FORT=1 TO LEN(T$)
1450 S$=MID$(T$,T,1):?&A80=ASC(S$)
1460 A%=&A:X%=&80:Y%=&A:CALL&FFF1
1470 VDU23,254:FORD=1TO4
1480 VDUD?&A80,D?&A80:NEXT
1490 VDU23,255:FORD=5TO8
1500 VDUD?&A80,D?&A80:NEXT
1510 VDU254,10,8,255,11
1520 NEXT:ENDPROC
1530 DEFPROCmove(X,Y,W$)
1540 GCOL3,3:VDU5:MOVEX,Y:PRINTW$:ENDPR
OC
1550 DATAkey,old,set,war,air,for,the,bu
g,any,bus
1560 DATAone,two,cat,new,use,guide,edit
or,update,pixel,modem
1570 DATAcheat,space,huge,case,desk,ico
n,open,vowel,magic,fist
1580 DATAverify,utility,program,occupy,
present,original,galaxy,density,memory,s
pecial
1590 DATApublication,evaluation,alterna
tive,resolution,printer,quality,televisi
on,calculator,cheating,challenge
1600 DATAtechnology,competition,introdu
```

abilities of throwing dice, to the solution of an Enigma puzzle from the New Scientist.

The manual has increased to 230 pages, including three new appendices – on BBC Micro equipment, MicroCodil discs and bugs.

Various internal changes make it possible to run MicroCodil 1.21 on BBC Micro, B Plus and Master computers. The new software disc contains a universal version of the interpreter which loads between &1900 and &7C00.

Dr Reynolds says nearly all knowledge bases set up under 1.2 should be useable under 1.21, the main exceptions being those that use the Expand facility.

MicroCodil 1.21 costs £50, £30 with return of original disc package, and there are Econet, HiBasic and demonstration versions available.

Drug deterrent

SMACK is the name of a new program from Daco Software, and its aim is to deter youngsters from drug abuse.

The text-only program, developed in consultations with experts in the field of drug abuse, starts by placing the user in a series of situations where heroin and other drugs may be available.

If he or she accepts the offer of a drug they are taken through a range of realistic situations which can result. These include the problems of supporting a drug habit, reactions of parents, decline in health, involvement with the police, and overdosing.

Each situation is accurately portrayed, and personalised on the basis of questions asked of the user at the start of the program.

The chances of certain events happening – a drug overdose for instance – reflect the statistical chances of such an occurrence.

Program users can see a continually updated summary of their progress, thus reinforcing the impact of what is "happening" to them.

Royalties from the program, which costs £18.50, are going to Drugline and All Saints Hospital, Birmingham.

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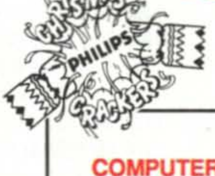

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From Page 73

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ction,description,simulation,specificati
on,professional,assortment,association,m
icrotechnology
 1610 DATAmanoeuvrable,automatically,com
patibility,flexibility,performance,adver
tisement,connection,neighbourhood,teleme
ssage,subscriber
 1620 DATAefficiently,artistically,spect
acular,entertainment,manufacturer,impres
sion,essentially,businessman,desperately
,accompany
 1630 DATAsophisticated,bidirectional,at
tachment,comprehensive,investigator,disa
ssembler,denomination,overheating,reputa
tion,anticlockwise
 1640 DATAemergency,predictable,opportun
ity,responsibillity,development,dodecahe
dral,approximate,correspond,temperature,
respectively
 1650 DEFPROClaserbeam(enx%)
 1660 VDU26
 1670 ?enx=((enx%-3)*16)MOD 256:?(enx+1)
=((enx%-3)*16)DIV 256:?char1=&30:?char2=
&30:?(char1+1)=&FF:?(char2+1)=0
 1680 s%=16*enx%+&3C90
 1690 REPEAT
 1700 FORI%=0TO7:I%?s%=&88:NEXT
 1710 s%=s%+&280
 1720 UNTILs%=16*enx%+&6210
 1730 PROCtri
 1740 ENDPROC
 1750 DEFPROCsetup2
 1760 *FX13 4
 1770 FORI%=&70A0 TO &70F0 STEP4:!I%=&FF
FAFFFA:NEXT
 1780 FORI%=&75A0 TO &75F0 STEP4:!I%=&FF
FAFFFA:NEXT
 1790 VDU29,0;0;24,95;367;1183;879;:CLG
 1800 FORst=0 TO 95 STEP5:S=&3CB0+RND(14
)*&280:S2=8*RND(43):st?table=S DIV 256:s
t?(table+1)=S MOD 256:st?(table+2)=S2 DI
V 256:st?(table+3)=S2 MOD 256:st?(table+
4)=&08:?(S+S2)=&08:NEXT
 1810 el=K%:level=0:crash=0:typed=0:scor
e=0:go=0:words=0:dec=H%:enx%=G%:PROClase
rbeam(enx%)
 1820 GCOL0,3:MOVE66,100:MOVE816,100:PLO
T85,66,220:PLOT85,816,220:GCOL0,1:MOVE80
,116:MOVEel+80,116:PLOT85,80,204:PLOT85,
el+80,204:MOVEel+80,116:GCOL0,0:PLOT85,8
00,204:PLOT85,800,116
 1830 VDU24,(enx%+1)*32+12;367;1183;879;
29,(enx%+1)*32+12;367;
 1840 *FX14 4
 1850 VDU4:PRINTTAB(34,27)STR$(level)
 1860 SOUND2,1,50,-1
 1870 ENDPROC
 1880 DEFPROCgo
 1890 *FX15
 1900 PROCstr(9,26,"Game Over")
 1910 VDU5,23;8202;0;0;0;0;
 1920 FORP=255TO0STEP-1:SOUND1,0,P,0:SOU
ND0,-10,7,1:NEXT
 1930 PROCstr(8,26,"Press Space")
 1940 REPEATUNTILGET=32
 1950 ENDPROC
 1960 DEFPROCnextlevel
 1970 SOUND1,2,150,50:TIME=0:REPEATUNTIL
TIME=250
 1980 level=level+1:words=0:VDU4:PRINTTA
B(34,27)STR$(level)
 1990 IF level/2=level DIV 2 dec=dec*2:I
F dec>16 dec=16
 2000 PROCtri:PROCl
 2010 *FX13 4
 2020 CALLremove:enx%=enx%+1:?enx=((enx%
-3)*16)MOD 256:?(enx+1)=((enx%-3)*16)DIV
 256:CALLremove
 2030 *FX14 4
 2040 PROCl:PROCtri
 2050 VDU24,(enx%+1)*32+12;367;1183;879;
29,(enx%+1)*32+12;367;
 2060 ENDPROC
 2070 DEFPROCtri
 2080 VDU26,29,0;0;
 2090 s%=16*enx%+&3C90:?s%=?s% EOR &88
 2100 e%=32*(enx%+.5):GCOL3,3:MOVEe%,366
:MOVEe%+32,366:PLOT85,e%+16,380:MOVEe%,8
76:MOVEe%+32,876:PLOT85,e%+16,862:ENDPROC
 2110 DEFPROCl:s%=16*enx%+&3C90:t%=16*en
x%+&5F90:FORI%=0 TO7:I%?s%=I%?s% EOR &88
:I%?t%=I%?t% EOR &88:NEXT:ENDPROC
 2120 DEFPROClch
 2130 G%=20:H%=4:K%=720
 2140 FORA=0 TO 1:PRINTTAB(7)CHR$141;CHR
$133;"* *"CHR$134"Flying Fingers"CHR$133
"* *":NEXT
 2150 PRINTTAB(14)"By Ray Smit"'''
 2160 PRINTCHR$133"Press"CHR$134"Space"C
HR$133"To Play Or"CHR$134"Return"CHR$133
"To Select"'TAB(13)CHR$133"Difficulty.";
 2170 REPEATA=GET:UNTILA=32 OR A=13:IF A
=32 ENDPROC
 2180 VDU28,0,24,39,6,12:PRINTTAB(5)CHR$
133"Position of Laserbeam ? <0-9>";:REPE
ATA=GET:UNTILA>47 AND A<58:G%=A-28:PRINT
;A-48
 2190 PRINTTAB(5)CHR$133"Speed of Words
? <1-3>";:REPEATA=GET:UNTILA>48 AND A<52
:H% =2*2^(A-48):PRINT;A-48
 2200 PRINTTAB(5)CHR$133"Level of Words
? <1-5>";:REPEATA=GET:UNTILA>48 AND A<54
:J%=(A-49)*10:PRINT;A-48
 2210 REPEATPRINTTAB(5)CHR$133"Amount of
Energy ? <1-100>";:INPUT""A:UNTILA>0 AN
D A<101:K%=7.2*A:ENDPROC
```

Run a business

THE Cement Business Game just released by South Yorkshire Systems for the BBC Micro has both an educational and an entertainment purpose.

It is primarily directed at sixth form and college students, for whom the simulation is geared toward teaching the economics and operations of running a business.

But it is also a program for business simulation enthusiasts who enjoy the challenge of testing their ability to keep a company afloat in a competitive marketplace. Price £35.

Range extended

THREE new programs have been added to the range of reading, number and road safety skills software for five to 12 year-olds from H S Software.

Entertaining English is a two program pack teaching language skills to children between 7 and 11.

The first part, Timeslip, displays sentences containing present tense verbs. A rocket collects each verb and travels back in time to an eerie cave. The player then has to choose the past form of the verb and return to the present time with it while avoiding a caveman and manic pterodactyl on the way.

Six skill levels cover both irregular and regular endings of many common words, and at the higher levels the player has to type in the word instead of simply matching it.

The second part, Busy, performs a range of actions on the screen against a scrolling background. The player has to type in a verb – at the higher skill level, an adverb as well – to describe each of the actions shown.

Entertaining graphics, and increasing scores for more unusual descriptions, help stimulates the child's imagination. More than 100 verb/adverb combinations are

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REVISED LOGOTRON LOGO £60.00

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REVISED LOGO EXTENSION DISK £15.00

This contains a number of specialist modules offering yet more facilities to the LOGO user - including extra commands for Turtle Graphics, File handling, Databasing, List Processing, new printer utilities and serial turtle drivers.

NEW CONTROL LOGO £15.00

This new version lets you talk to all the ports on BBC computers. With Control LOGO it is simple to create your own procedures for controlling buggies, robots and models. Because it works with a full computer language Control LOGO offers much more power and flexibility than stand alone control programs.

NEW MUSIC LOGO £15.00

The latest addition to the range of Logotron LOGO extensions, Music LOGO provides over 30 new commands to let you compose and play your own computer generated music. Forget 'Sound' and 'Envelope', Music LOGO uses standard musical terms to set chords, pitch, tempo, voices and instruments.

PENDOWN £39.00 (Schools £34.00)

PenDown is the new word processor designed for children. It combines power and ease of use with features including WYSIWYG text formatting, pull down menus, story planner, Font editor, user definable dictionaries and Help screens.

NEW ADVENTURE WRITER £15.00

An extension to PenDown, this unique tool combines word processing with simple programming commands to provide a complete environment for creative writing. Structure a story in the PenDown Planner, write it in PenDown's full featured word processor and the Adventure Generator will combine your text and your instructions to create an interactive game for someone else to play.

NEW ROBOTARM SYSTEM £89.00

An affordable, ready made robot arm, this system includes the Spectravideo 5 axis RobotArm, BBC interface, Guide book, Control LOGO and Control BASIC. Educational and recreational, the Logotron RobotArm system represents outstanding value for money.

NEW DATATREE £15.00

DataTree is an easy to use tree-structured data retrieval program. Not limited to binary trees it allows up to 20 branches (which can double back) from each of its page size cells. Possible uses include creation of small expert systems and adventures.

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- Words and Pictures
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- Division

BBC Disk	BBC Tape	Electron Tape
£9.95	£6.95	£6.95

Mathematics 1 age 5-12yrs
- Addition 1
- Subtraction 1
- Shapes
- Times table 1
- Times table 2

BBC Disk	BBC Tape	Electron Tape
£9.95	£6.95	£6.95

Mathematics 2 age 9 upwards
- Addition 2
- Subtraction 2
- Multiplication 1
- Division 1
- Number Signs

BBC Disk	BBC Tape	Electron Tape
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These programs have been developed with the aid of teachers and have been tested in Essex Schools and homes. The programs actually teach the concepts of Borrow, Carry & Payback.

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SOFTWARE

Crafty resource for the teacher

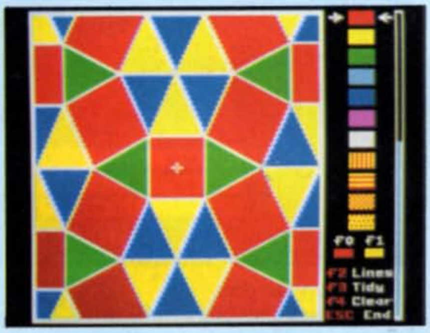
AS its name implies, Picture Craft from BBC Soft allows you to create designs and pictures, as simple or complex as you like. You can colour them in, save them to disc, print them out and even use them to play a number of games and puzzles.

Behind this simple description lies a marvellous resource for teachers. Designed for 6 to 14-year-olds, the program forms a complete basis for the mathematical exploration of shapes, symmetry, tesselations and so on.

Sample pictures are included in compacted form and have to be transferred to a disc of you own to use. Some of these are designed by children, and give you an idea of the wide range of activities possible, as does the 120 page manual.

The latter not only gives you clear step-by-step instructions, but also a section with ideas and suggestions for activities based on the sample designs. A further section written by Godfrey Hall gives teachers a wealth of ideas on how they may use Picture Craft as a springboard for activities and projects away from the computer.

One clever feature is that you can set up the main menu to offer just the activities and features you require. So, for instance, if young children are designing a picture an adult can set the menu to offer them just a few simple features instead of the full range of activities which older children could tackle.



Initially you choose the option Design A Picture. Using the menu throughout couldn't be simpler. You move a highlight to the option you require by pressing the spacebar. Return then selects it.

You build up your picture from the standard set of seven basic shapes – six different polygons such as a square and triangle plus a circle, though later on you can choose other shape sets. Pressing the spacebar steps through the shapes, the four arrow keys move them around the screen and Return fixes them in position.

Program: Picture Craft
Price: £19.95
Supplier: BBC Soft, 35 Marylebone High Street, London W1M 4AA
Tel: 01-580 5577

You can also stretch, squash, turn or flip any shape with the red function keys, as well as draw lines and edit your shapes. As you add more shapes and lines to your picture, a green bar on the right of the screen will rise. This is the indicator telling you how much picture memory you have used up.

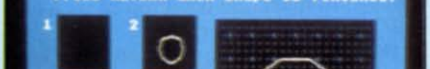
A design help card placed above the function keys indicates their use. If a young child was designing a picture you could set up the options to turn off some of the function keys, making the package very simple for him to use. This flexibility is one of the main strengths of the software.

Once you have designed your picture you can paint it using a rapid flood fill. Seven plain colours and four patterned fills are possible. Again you can set up the menu to include options on colour mixes, changing the outline colours and so on. As before, you use a combination of spacebar, arrow keys, Return and function keys, the features of which are symbolised on a painting help card. This time the green bar on the right of your picture indicates how much painting memory you have used.

After painting your picture the next step is to save it. It can be also printed on an Epson-compatible printer either fully shaded or in outline only for children to colour in.

You can go on to incorporate saved pictures in four different puzzles. In Swaps, your picture is mixed up into a number of squares and your task is to rearrange the pieces. For Twister the puzzle squares are in the correct places but

→



```
   Use arrow keys to move corner,
  plus SHIFT to move whole shape.
Use SPACE BAR (or A/Z) for next corner.
  Press RETURN when shape is finished.
```

→

accepted.

If the child describes all the actions successfully they are replayed in sequence to a musical accompaniment with each description highlighted on the screen. Price £7.95 on cassette, £11.95 on disc.

Adventurous English is a game that helps children to develop grammar and language skills in an entertaining way.

Children gain an understanding of prepositions and develop their problem-solving skills by helping Ben discover treasures and avoid hazards on his dangerous journey. Price £5.95 cassette, £7.95 disc.

Reading Pack 2a, for ages six to nine, is the latest addition to the Read-Right-Away series and contains two new games to boost reading skills.

Program 1, word endings, has an Olympic flavour, with the player's sportsmen competing against a clock and each other in four events to win a prize.

Program 2, vowel consonant digraphs, is an exhilarating skateboard chase with the hero of the game jumping through flames and over ramps to avoid a killer shark.

Price £7.95 on cassette, £11.95 on disc.

Alternative TFS rom

THE Advanced Teletext System is a new rom-based software package from BBC Publications designed as an alternative to the TFS rom for the Acorn teletext adapter.

The rom is fully compatible with all BBC Micros including the Master range, and any Acorn second processor.

Filing commands including telesoftware downloading will work with any correctly written filing system, including Econet, ADFS and tape.

When downloading telesoftware a single keypress will present a catalog of all the software available on the current television channel, indicating the filename, file type and size.

Selection of a file is made using the up or down cursor keys.

Pressing the Return key will automatically select the required page, download the file, save it to

→

the current filing system then re-present the telesoftware menu.

During downloading the screen displays the filename, load and execution addresses, and the number of blocks captured and remaining.

Downloading progress is shown graphically, indicating which block has been found, and whether it has been correctly received.

When all the blocks have been downloaded the catalog is displayed again for further file selection.

The ATS rom uses only one page – 256 bytes – of ram. This means that on a BBC Micro with disc interface, Page will be set at &1A00 when the teletext system is in use. Unlike TFS, the ATS correctly claims private workspace in a Master, keeping Page at &E00.

No ram workspace is used if the rom is disabled – a command for this is provided – or if the adapter is not present or switched off. The state of the system is shown by *HELP.

Teletext pages from any UK television channel can be received and displayed. The channel can be changed by a single keypress and page selection is equally easy. Sub-pages can be explicitly requested if required.

The Advanced Teletext System rom can be purchased by mail order only from BBC Publications, PO Box 234, London SE1 3TH. Price £7.95.

Community project

EIGHT BBC Micros are playing a part in the latest community project of Edinburgh University Settlement, the voluntary organisation which helps maintain the traditional links between the famous university and local citizens.

Seven machines are in the classroom at the Microbeacon Centre, serving a pioneer pilot scheme which offers free computer literacy courses for the unemployed and others.

The other BBC Micro is the host computer for the Settlement's community bulletin board which operates 24 hours a day, seven days a week.

Microbeacon coordinator John Palmer told *Education*

From Page 77

they are rotated through one, two or three-quarter turns.

Swaps and Twists is a mixture of both games – you have to swap and turn the pieces of the puzzle to restore the picture. Block Slide is the hardest of all and will prove a challenge to many adults. The bottom right-hand square is removed and the squares are mixed up by sliding them in and out of the empty space. The aim is to slide them back into their correct places.

The magic painting game is a favourite of young children. An invisible picture is drawn on the screen and is gradually revealed as you paint it. Children love to guess what the picture is going to be.

Two more options on the main menu allow you to design your own shape set or to use one of the seven alternative sets provided. These include stars, three-dimensional shapes and various polyominoes.

Older children can use them to explore symmetry, tesselations and so on, the sample designs showing the sort of patterns that can be created. A shape design worksheet allows children to plan their designs before building them on the computer.

The manual includes a comprehensive account of follow-up activities: Projects on shape, colour, symmetry, tesselations, polyominoes, area and direction, plus general themes on space, travel, homes and people. There are suggestions for various games, as well as sample worksheets.

A section on technical notes is included. This explains how to use the package on an Econet system, how to use the pictures you have created in your own programs, and also various disc tips. Throughout the manual there are several troubleshooting sections which attempt to sort out possible queries including how to recover a picture when the Break key has been pressed.

Picture Craft has endless possibilities, and is a valuable and exciting resource for the classroom, be it infant, junior or secondary. If you're at all interested in using your BBC Micro educationally take a look at it. You won't be disappointed.

Carole Sillers

Field data analysis

GEOGRAPHY TODAY is a television series aimed at students over 16, and Rivers is a software package designed to support the episode entitled River Channel Forms.

All sections of the program are selected from a menu, the first five of which are concerned with handling the river data files. These can hold two types of data, estimated and field.

The former is used if you are unable to carry out detailed field work. You enter data for upstream and downstream heights and channel length, and this information is used to calculate the slope.

Next you select which of seven descriptions best fits the roughness and width of the channel in question. A similar selection is then made concerning bed type, whether it is composed of boulders, pebbles or sand. Finally you enter estimates of bankfull and low flow widths and depths.

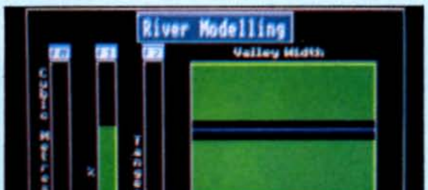
If you choose to enter field data then you will enter similar information to that already mentioned, the difference being that you are expected to enter large amounts of raw data for channel depths and pebble size.

In both cases high quality proformas are supplied to make the collation of data and data entry much easier.

The next four menu options are concerned with analysis of your input and it is at this point that the limitations of estimated data become apparent.

Bankfull and low flow data analysis options will produce cross sectional diagrams based on your field measurements. Examples of both types of data file are supplied on the disc.

Program: Rivers
Price: £19.75 (disc only)
Supplier: Mercury Music, PO Box 194, Sevenoaks, Kent TN15 8TZ.



Use the function keys to select option
Use up/down arrows to change valley width
Confirm by pressing RETURN

All diagrams and data can be directed to a printer. And statistical analyses such as Spearman's R test and scatter graphs may also be performed on your data.

The final menu option is a river modelling program which is intended to give some insight into the processes which control river channel patterns.

By entering values for slope, discharge, bank material and valley width, the program will calculate and draw the most probable pattern of flow for that river. It then goes on to overlay the subsequent changes in the river which occur with the passage of time.

Rivers is a most useful tool for the analysis of field data. It is well documented, the displays are impeccable, and the river modelling program is ingenious.

Hannah Frances

The most adventurous and original way to test your French ever devised.

FRENCH on the RUN!

The adventure game with a big difference.

£9.95 cassette
£11.95 5¼" disc
£13.95 3" disc

You're on your own in Occupied France — facing the toughest test that a British pilot has ever had to experience!

DATABASE SOFTWARE

The year is 1943. As an RAF officer stranded in Occupied France you have one aim — to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks — from buying food to taking buses — place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence — you need the password from the last before attempting the next. The standard of French required is about O level, though on the last route it rises to just below A level.

And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

For teachers: *French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.*

TO ORDER TURN TO THE FORM ON PAGE 167

Micro-Communications - The Next Generation

Commstar II

For more than two years, Commstar has dominated the BBC communications software market. Now, Pace have introduced Commstar II, more powerful, more flexible and even easier to use. Many new facilities like 'pull-down' windows and menus have been added to Commstar's already impressive list of features.

Commstar II is compatible with BBC Model B, B+ and Master Series. Commstar II is still only £29.57 plus V.A.T. and comes complete with a comprehensive instruction manual and a years free subscription to Microlink on Telecom Gold.

Existing users of Commstar can upgrade to the new version for only £12.00, (including V.A.T. and P & P).

£265.00
£399.00
£499.00
+ VAT

Nightingale V21/V23

The Nightingale modem has become the standard by which other low cost modems are judged.

Combining simplicity of use with true multi baud rate operation, Nightingale can provide access to both viewdata (1200/75 & 75/1200 baud) and full duplex (300/300 baud) systems.

All Pace modems are BABT approved and are supplied with FREE Commstar II software

Linnet V21/V23

Linnet sets new standards in modem performance by combining many facilities, previously available only on 'professional' modems, in a single versatile yet affordable product.

The Linnet provides both 300 baud and 1200/75 operation.

Advanced micro-processor control and Hayes compatibility make it suitable for use on any computer with an RS232 port and it will operate virtually any terminal software.

All features including Automatic dialling are initiated via simple commands entered at the terminal and Linnet's comprehensive tone detection facilities allow full call progress monitoring via English-like messages such as "NO CARRIER" and "NO DIALTONE". Successful calls are notified via the "CONNECT" message common to Hayes modems.

Series Four
V21/V23/V22/V22 bis

The last word in microcommunications, Series Four models include as standard V21/23 CCITT capability coupled with 'intelligent' microprocessor control.

Auto dial/auto answer, auto speed buffering, auto baud rate detection, LED carrier strength indicator, 64 number memory and LCD display are amongst features too numerous to mention here, which make Series Four modems the first choice for business and professional applications.

All models are Hayes compatible, they will support multiple baud rates. All Series Four models include as standard V21/V23 and V22 (1200/1200 baud) and V22bis (2400/2400 baud) versions are also available.

Further information on these and other Pace products is available from good dealers everywhere, or direct from Pace.

PACE

BRINGING TOMORROW A LITTLE CLOSER....!

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Prestel Mailbox No. 274729306 Telecom Gold Mailbox No. 79:PCE001 Int. Tel. No. +44274488211

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Incompatible micros

THERE are two BBC Bs in the primary school at which I work. Both seem the same, but one will load a particular program from disc while the other will not. Have you any ideas why this happens, and how can I cure the problem? – **E. Croft, Newcastle.**

● We have known this to happen in a school where a Password rom was fitted to one of the computers. There must be some difference between your computers. Type *HELP on both and see if there is any difference in the messages you receive. Also, check the value of PAGE on both machines.

If PAGE is higher than &1900, try typing PAGE=&1900 before loading your program. If you need to switch off an offending rom you need to know its rom select number. These are in the range 0 to 15, though you'll need a rom board to get all of these. The four rom sockets in the standard Model B are on the right of the machine under the keyboard. They are numbered 15 downwards from the right.

To disable the second from the right (socket 14) you would enter ?(673+14)=0. Similarly other sockets can be disabled by substituting the appropriate number instead of 14. Note that pressing Break will cancel either of the above, so load your disc using *EXEC!BOOT.

Restricted memory

I USE Mini Office II for preparing lesson notes, and find the various sizes of type that can be produced by an Epson printer invaluable for producing professional looking documents. There is, however, a small problem – the amount of text that can be stored in memory at once.

My longer worksheets spread over two files. To print out the sheet I have to load file1, *then print, load* file2, *and print. Multiple copies involves a lot of loading and printing, and I cannot use the multiple copy printout facility of Mini Office II. Is there any way I can get more into the memory at once? –* **Ernie Hudson, Swindon.**

● The rom version of Mini Office II allows far more text in memory at once, but with all versions of Mini Office II, the command *GF,* which stands for *Get File,* allows you to handle larger documents than the memory will hold. At the end of *file1* put the embedded command *GF"file2".* You'll find that *file2* will then be printed automatically whenever *file1* is printed, so multiple copies of *file1* will result in multiple copies of the complete document.

Equations oddity

IN THE November issue of Education Micro User *there is a short program for solving simultaneous equations.*

Having an interest in mathematics I set up the routine to give it a try. Opening the nearest maths book I selected a problem and lo and behold the answer came out correctly.

A colleague asked what I was doing so I showed him the listing. He then said it was done by substitution – and promptly began to work it out from first principles.

The answer, checked against line 120, was different. I did the problem with him – again a difference. So we checked for the other unknown, with similar results.

After cross-checking we decided that lines 100 and 110 were not required if lines 120 and 130 were changed according to our calculations:

```
x=((b*f)–(c*e))/((b*d)–(a*e))
y=((c*d)–(a*f))/((b*d)–(a*e))
```

Now there may be an explanation as to why the equations were worked in that particular way, but it does seem a bit long to declare certain variables to have the opposite sign so that the dividing pairs of variables can be transposed.

Are we right or was there some other reason that we have not as yet spotted? **D. R. George, Woking.**

● I noticed this myself when I tested the program, but didn't want to change a working program in case there was a reason for it. Can any of our readers see why the equations were solved that way?

Tables test program

I find the tables test program in the December 1986 issue of Education Micro User *most useful, but after the test whether I press C or space I cannot get the correct answers printed. Could you please help? –* **J. Bee, Stockport.**

● There is a misprint in the first statement of line 290. Just change the 67 to 99 and you will have no further problems.

Micro User that originally the computer literacy course was designed for about 100 students.

"But we were snowed under with applications from unemployed youngsters, people who want to retrain for new careers, and even old folk who want to keep abreast of their computing grandchildren", he said.

"In the end we managed to shoe-horn 174 people on to the course and we will certainly be repeating it in the future as we have a substantial waiting list for places".

The course has been tailored to allow students as much hands-on experience as possible within a stress-free atmosphere.

There are 10 two-hour classes covering an introduction to the BBC Micro, word processing, databases, communications and basics of programming.

Extension courses can also be taken, where a more detailed study is made into one of the subjects covered by the general course.

Full back-up notes are provided at each session, but no tests or assessments are involved. Students are encouraged to use the self-assessment facilities provided.

The Microbeacon bulletin board, on 031-226 3672, is a live database where users can exchange information on a personal or community basis.

Its direct contact facility – user-to-user or user-to-sysop – is especially relevant to the needs of deaf users.

There is also space for storage of computer-aided learning programs which users can download or upload to their own systems.

"As a community-orientated project, Microbeacon is increasingly going out into the local area advising, setting up new terminals and generally expanding the facilities", said Palmer.

"Current users include two disabled centres, one hospital, a centre for the unemployed, an education resource centre as well as many individuals".

Palmer is Microbeacon's full-time coordinator. Under Manpower Services Commission sponsorship, his work is backed up by three part-time community programme workers on secondment.

The only truly integrated suite of ROMs

This unique system allows all ROM-LINK compatible ROMs to be fully integrated. Up to 16 'packages' can be held in memory at once, so for example you could have a spreadsheet and a chart and a document in the word processor all being worked on at the same time. The ROM-LINK system also allows any data to be transferred directly from any package to anyother. For example spreadsheet data could be imported into the word processor, and then back again into the spread-sheet, then into INTER-CHART to plot a graph.

ROM
INTER-WORD
The integrated word processor for the BBC Microcomputer
Computer Concepts
ROM
INTER-CHART
The chart and graph plotting program for the BBC Microcomputer
Computer Concepts
ROM
INTER-SHEET
The spreadsheet program for the BBC Microcomputer
Computer Concepts
ROM
INTER-BASE
The data management system for the BBC Microcomputer
Computer Concepts

* TO BE RELEASED SOON

FOR THE BBC MICRO

Computer Concepts

The Master Compact Compatible

INTER-WORD

The latest word processor from the same stable as WORDWISE and WORDWISE PLUS, the most successful programs ever written for the BBC Micro computer. With years of experience and feedback from users, the authors of INTER-WORD have ensured that it suits everyone's needs. A great deal of attention has been paid to ensuring that INTER-WORD is fast, efficient and above all simple to use. Being menu operated the newcomer does not need to remember strange key combinations or command names. The menus are not a burden to the experienced user since there are shortcuts to access many of the features.

REVIEWS

"the most significant program since WORDWISE." ... "INTER-WORD on the BBC Micro compares favourably with word processors costing five or ten times as much on the IBM PC and the like." ... "INTER-WORD is a real pleasure ... a truly worthy successor to WORDWISE"

Gordon Taylor A&B Computing

"Rulers can be used to manipulate text to your satisfaction. This is a joy to use."
"INTER-WORD is certainly an advance on most other word processor packages."

Popular Computing Weekly, July '86

Technically, too, the program is astounding ..."
"... quite stunning handling characteristics"

Viewfax Tubelink—August '86

"INTER-WORD is the most powerful and comprehensive word processor available for the Beeb today. It is more powerful and flexible than View and still retains much of the friendliness and ease of use of Wordwise. Inter-Word looks set to become the standard word processor for the BBC Micro."

Beebug, Aug/Sept '86

Some of its special features are:

•Automatic re-formatting
This enables the user to just type - no keys to press to re-format the paragraph after changes to the text or margins have been made; the margins on the rulers can simply be dragged, all text being instantly re-formatted to the new settings.

•Multiple documents in memory.
Most people do not work on one document at a time. INTER-WORD allows up to 16 documents to be stored in memory at once, and text to be transferred from one to another.

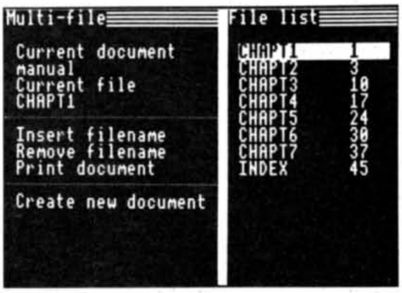
•Multi column
Built in facilities for printing text in up to 5 columns.

• Pull down menu operation
Simple and fast selection of all INTER-WORD options and page layout.

20% discount

Available to all WORDWISE PLUS owners. Simply quote you serial number, name and address when ordering direct. Discount price;
£39.20 + VAT (£45.08 incl.)

THE NEW WORDPROCESSOR FOR THE BBC MICRO



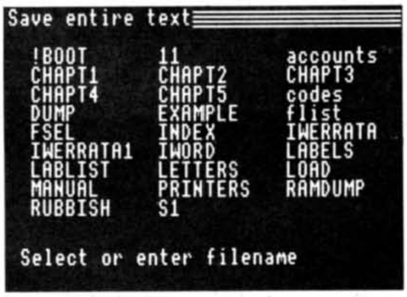
```
Multi-file                File list
                          
 Current document         CHAPT1       1
 manual                   CHAPT2       3
 Current file             CHAPT3      10
 CHAPT1                   CHAPT4      17
                          CHAPT5      24
 Insert filename          CHAPT6      30
 Remove filename          CHAPT7      37
 Print document           INDEX       45

 Create new document
```

•Multi-file operation
Very large documents can be handled with ease. INTER-WORD's unique multi-file mode puts virtually no limits on document size and allows simple and fast movement to any point in the document.

•Block operations
These are common to most word processors, but with INTER-WORD any part of the text can be marked and then instantly moved, copied, deleted, printed, saved, underlined etc. There is no limit to the amount that can be marked.

•Specific page printing
Any page or range of pages may be printed, even in multi-file mode, with any number of copies.

•File selector
The file selector displays a list of all files - move to one and select it. You will never have to type or remember filenames again.



```
Save entire text

  !BOOT       11          accounts
  CHAPT1      CHAPT2      CHAPT3
  CHAPT4      CHAPT5      codes
  DUMP        EXAMPLE     flist
  FSEL        INDEX       IWERRATA
  IWERRATA1   IWORD       LABELS
  LABLIST     LETTERS     LOAD
  MANUAL      PRINTERS    RAMDUMP
  RUBBISH     S1

 Select or enter filename
```

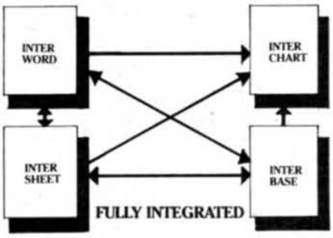
£49.00+vat(£56.35)

Computer Concepts

Gaddesden Place, Hemel Hempstead,
Herts. HP2 6EX, England.
Telephone (0442) 63933

•On screen style changes
Underline, bold and a special 'dotted' style are shown on screen exactly as they would appear on the final printout. Also left, centred and right justified text is shown on screen as you edit. What you see on screen is really what you get on the printout.

•On screen page breaks
You need never lose your place on the page. Top and bottom spaces, with any associated headings, footings or page numbers etc. are shown at all times. Like most features in INTER-WORD, a menu option lets you turn paging off.



•Integrated spelling checker
To be made available soon, this entirely ROM based spelling checker allows text to be checked as it is typed or after typing, at over 9000 words per minute.

•40,53,80 and 106 column screen modes
•Mail merge
•Integrates with all other parts of INTER family
•Automatic page numbering, with headers and footers
•Very fast and smooth scrolling
•Powerful search and replace facilities including wildcards, upper/lower case sensitivity, stored search and replace strings for instant re-use.
•Automatic word count
•Fast simple cursor movement to any point
•Easily tailored to any printer
•Line numbering
•Selectable screen colours
•Compatible with the B, B+ and Master; Solidisk, Aries and Watford shadow RAM boards.

Software is now more important than the hardware, especially with todays falling hardware prices.

INTER-WORD is the most sophisticated and professional word processing package available for the BBC Microcomputer.

MONEY-BACK
Guarantee
Buy INTER-WORD—if you don't like it—send it back for a full refund!
(Available when purchasing direct from Computer Concepts)

ook for the holly
bols and then see page 5
our special XMAS offers.

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

BBC MASTER SERIES

AMB15 MASTER Foundation 128K. £395 (a)

AMB12 MASTER ET (ANFS only)128K £320 (a)

AMCO6 Turbo 65C02 Module £99 (b)

ADC08 512 Processor £199 (b)

ADF13 ROM Cartridge	£13 (d)	ADJ23 Ref Manual Part II	£14 (c)
ADF10 Econet Module	£41 (c)	ADJ24 Adv Ref Manual	£19.50 (c)
ADJ22 Ref Manual Part I	£14 (c)	View User Guide	£10 (d)
BBC MASTER Dust Cover	£4.75 (d)	Viewsheet User Guide	£10 (d)

BBC MASTER COMPACT

A free packet of ten 3.5" DS Discs with each COMPACT"

See page 5 for details

SYSTEM 1
128K, Single 640K Drive & bundled software. £385 (a)

SYSTEM 2
System 1 with a 12" Hi Res Monochrome Monitor. £469 (a)

SYSTEM 3
System 1 with a 14" Med Res RGB Monitor. £599 (a)

Second Drive Kit. £99 (c)

Extension cable for external 5.25" Drive. £12.50 (d)

UPGRADE KITS

1.2 OS ROM	£15 (d)	ADFS ROM	£26 (d)
DNFS ROM	£17.50 (d)	1770 DFS Kit	£43.50 (d)
BASIC II ROM	£22.50 (d)	Econet Kit	£55 (d)

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Econet Bridge	£174 (b)
Econet Socket Set	£29 (c)	Printer Server Rom	£41 (d)
File Server Level II	£125 (b)	10 Station Lead Set	£26 (d)
Master FS Utility Disc	£17.25 (d)		

32016 CO PROCESSOR

For full specification see page 5 £999 (a)

CAMBRIDGE W/STATION

For full specification see page 5 £3,450 (a)

PANOS/PANDORA Upgrade incl 32000 BASIC FP. £29 (d)

Co-Processor upgrade to 10 MHz operation for faster processing. £POA (d)

32016 Instruction Set Manual. £25 (c)

WINCHESTER DRIVES

Acorn 30 Mbyte Winchester with File Server Level III and ADFS hierarchical filing System. £1,549 (a)

P20HD TECHNOMATIC 20 Mbyte Winchester Drive fully compatible with Acorn ADFS and FS III. Includes ADFS Rom. £635 (a)

P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. £849 (a)

P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. £1,499 (a)

TS10 10 Mbyte Tape Streamer Backup unit with utilities. £695 (a)

TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. £19 (d)

WINCHESTER Drive Multiplexer
A unique way of allowing two to four computers to share the large storage capacity of Winchester drives for saving and loading data.

TWM2 for two computers.	£99 (b)
TWM4 for four Computers.	£159 (b)

Details on Technomatic Winchesters and accessories on page 6

SECOND PROCESSORS

ACORN 6502 2nd Processor £173 (b)

TORCH ZEP100 £229 (a)

MULTIFORM Z80
TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar. £299 (b)
MS/DOS Read/Write Utility. £49 (d)
See page 7 for details.

ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. £265 (a)

TELETEXT ADAPTOR

Converts your computer into a teletext receiver. £119 (b)

BBC Publications rom for enhanced Teletext Utilities. £7.95 (d)

ROBOCOM BITSTICK

BITSTICK II £755 (a)

Upgrade for Bitstick I to II £415 (a)

Epson FX80 Dump for Bitstick I/II £25 (d)

PRINTERS

EPSON LX86
120 cps, variety of fonts including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface standard. £209 (a)

EPSON LX80/86 Tractor Feed £20 (c)

EPSON LX80/86 Sheet Feeder £49 (c)

EPSON FX800
An enhanced version of FX85.
Call for details. £319 (a)

EPSON FX100
An enhanced version of FX105.
Call for details. £449 (a)

EPSON EX800
See specification on page 5. £409 (a)

EPSON LQ800
See specification on page 5 £439 (a)

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As LQ800 but wider carriage for 136 columns. £619 (a)

TAXAN KP815
Enhanced KP810 with 160cps and full IBM compatibility. £239 (a)

TAXAN KP915
Enhanced KP910 with 180cps and full IBM compatibility. £369 (a)

NATIONAL PANASONIC KX P1080
See specification on page 5. £149 (a)

STAR NL 10 (Parallel Interface) £239 (a)

STAR NL 10 (Serial Interface) £279 (a)

EPSON JX80 colour printer £420 (a)

INTEGREX Multicolour Inkjet printer. £549 (a)
Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics. £525 (a)
BBC Screen dump for Integrex. £15 (d)

BROTHER HR20
A new attractively styled printer from Brother with unusually quiet operation, host of new fatures, including option to copy current documents. 8K buffer standard expandable to 16K. Parallel & Serial ports as standard. £329 (a)

JUKI 6100 Daisy wheel printer
15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface. £279 (a)

PLOTTERS

See details on page 5.

EPSON HI 80 PLOTTER	£319 (a)
HITACHI 672 PLOTTER	£459 (a)
GRAPHICS WORKSTATION	£599 (a)
LINEAR GRAPHICS A4M PLOTMATE	£299 (a)

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer
Parallel buffer for internal fitting to most Epson printers. Available in two buffer sizes, 32K and 128K. Simple to instal.

PB32 (32K)	£69 (c)
PB128 (128K)	£99 (c)

TECHNO SHARER BUFFER
A unique sharer/buffer connects upto 3 computers to a single printer with auto scan and switching to computer outputting the data. Printer PAUSE, COPY and CLEAR facility. Mains powered, two buffer sizes 64K & 256K

TSB 64 (64K)	£199 (b)
TSB 256 (256K)	£275 (b)

Send for details on multi input/output serial buffer.

PERIPHERAL & COMPUTER SHARERS
High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

		Parallel		Serial
3 Computers to 1 Printer	36v36-3	£69 (c)	25v25-3	£65(c)
4 Computers to 1 Printer	36v36-4	£85 (c)	25v25-4	£75(c)
2 computers/2 Printers X-over	36v36-x	£69 (c)	25v25-x	£65(c)
BBC Cable set 3 to 1 (1m ea)		£32 (d)		£34(c)
BBC Cable set 4 to 1 (1m ea)		£39 (d)		£41(c)

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable £22.00 (c)

Paper & Labels
Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12 (b)
2000 sheets 14½ × 11"	£18.50 (£4.50)
1000 sheets A4	£12.50 (£3.50)

Labels/1000

Single Row 3½ × 1 7/16"	£5 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

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Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

DISC DRIVES

Full details on page 6.

All drives fitted with MITSUBISHI mechanisms.

5.25" Single Drives 40/80 switchable:

TS400 400K/640K	**£114 (b)**
PS400 400K/640K with integral mains power supply	**£129 (b)**

5.25" Dual Drives 40/80 switchable:

TD800 800K/128OK	**£226 (a)**
PD800 800K/1280K with integral mains power supply	**£229 (a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£249 (a)**

3.5" 80T DS Drives:

TS351 single 400K/640K	**£99 (b)**
PS351 single 400K/640K with integral mains power supply	**£119 (b)**
TD352 Dual 800K/1280K	**£170 (b)**
PD352 Dual 800K/1280K with integral mains power supply	**£187 (b)**

DISC DRIVE MULTIPLEXER

Full specification on page 6.

TDM2 Dual Unit: 2 computers/one drive unit	**£75 (b)**
TDM4 Quad Unit: 4 computers/one drive unit	**£135 (b)**

3M FLOPPY DISCS

5.25" Discs in packs of 10

FREE [illegible]

744 40T SS DD	**£10.00 (d)**
745 40T DS DD	**£12.00 (d)**
746 80T SS DD	**£14.50 (d)**
747 80T DS DD	**£16.00 (d)**

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD	**£20 (d)**
80T DS DD	**£25 (d)**

BULK DISCS

High quality unlabelled discs supplied in packs of 50 in a storage box. The 5.25" discs have the reinforcing hub rings. These discs are guaranteed for life.

50 5.25" 40 T single sided discs in lockable box.	**£35 (b)**
50 5.25" 80T double sided discs in lockable box.	**£45 (b)**
50 3.5" 80T double sided discs in lockable box.	**£95 (b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	**£12.50 (d)**
3.5" Kit with 20 disposable discs	**£14.00 (d)**

DISC STORAGE BOXES

DB530 Non Lockable 30 x 5.25"	**£6.00 (c)**
DB340 Lockable 40 x 3.5"	**£8.50 (c)**
DB550 Lockable 50 x 5.25"	**£9.00 (c)**
DB570 Lockable 70 x 5.25"	**£11.00 (c)**
DB5100 Lockable 100 x 5.25"	**£13.00 (c)**

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	**£179 (a)**
Microvitec 1431AP As 1431 + composite video and sound input	**£199 (a)**
Microvitec 1451 Medium Resolution 653 pixels	**£225 (a)**
Microvitec 1451AP As 1451 + composite video and sound input	**£259 (a)**
Microvitec 1441 High Resolution 895 pixels	**£365 (a)**

Microvitec 20" RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	**£380 (a)**
Microvitec 2040CS High Resolution RGB/Comp Video	**£685 (a)**
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	**£219 (b)**
PHILIPS 8501 RGB Standard Resolution	**£139 (a)**
TAXAN SUPER VISION II 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	**£279 (a)**
TAXAN SUPER VISION III 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	**£319 (a)**
MITSUBISHI XC1404 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	**£219 (a)**

12" MONOCHROME MONITORS

TAXAN KX1201G Hi Res green etched screen	**£90 (a)**
TAXAN KX1202G Hi Res Long Persistence (P39)	**£95 (a)**
TAXAN KX1203A Hi Res amber etched screen	**£95 (a)**
PHILIPS BM 7502 Hi Res green screen	**£75 (a)**
PHILIPS BM7522 Hi Res amber screen	**£79 (a)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	**£20 (c)**
Philips Swivel Base	**£14 (c)**
Monitor Stand Models B & B+	**£10 (c)**
Monitor Stand Master	**£13 (c)**
Double Tier stand Models B, B+ or Master	**£24 (b)**
Taxan RGB Lead	**£5 (d)**
Microvitec Lead	**£3.50 (d)**
Monochrome BNC/Phono Lead	**£3.50 (d)**

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	**£37 (c)**
ATPL Battery backup kit	**£16 (d)**
ATPL Board for BBC+ (now in stock).	**£31 (c)**
RAMROM 15 for Model B. External board in an attractive case — easy access to sockets. 6502 Processor signals for development work.	**£69 (b)**
TIME WARP Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	**£31 (d)**

MODEMS

(All modems are BABT approved)
See page 7 for modem specifications

MIRACLE WS2000V21/23 & BELL stds	**£102 (c)**
WS2000 Auto Dial Card	**£27 (d)**
WS2000 Auto Answer Card	**£27 (d)**
WS2000 SK1 Kit	**£5 (d)**
WS2000 DS1 disc	**£10 (d)**
WS2000 Data Cable for BBC	**£6 (d)**
MIRACLE WS4000 V21/23	**£149 (b)**
MIRACLE WS3000 V21/23	**£295 (b)**
MIRACLE WS3000 V22	**£495 (b)**
MIRACLE WS3000 V22 bis	**£650 (b)**
WS3022 1200/1200 fd	**£395 (b)**
WS3024 2400/2400 fd	**£570 (b)**
BBC Data Cable for WS3000/4000	**£7 (d)**
GEC DATACHAT Modem V23 1200/75, 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. **Special offer price**	**£39 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

See page 8 for detailed specification

Compatible with B, B+ and Master

EPROMER II with disc based software and rom image	**£99 (b)**
MPROMER	**£49 (c)**
META ASSEMBLER	**£145 (b)**
PORTAL EPROM EMULATOR 128K	**£185 (b)**
PORTAL EPROM EMULATOR 512K	**£285 (b)**
TEAM Disassembler	**£145 (b)**

EPROM ERASERS

UV1B 6 eproms, safety cutout	**£47 (b)**
UV1T 6 eproms, timer, safety cutout	**£59 (b)**

EPROMS/RAMS

2764-25	**£2 (d)**
27128-25	**£2.50 (d)**
6264LP-15	**£3.40 (d)**

Look for the holly symbols and then see page 5 for our special XMAS offers.

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CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B+ & MASTER (See page 9 for specification)	
BASIC Version	£59 (d)
Tracker Ball/Mouse Version (TM)	£71 (d)
TM Version plus Tracker Ball	£105 (c)
TM Version plus Mouse	£90 (c)
Plotter Driver Generator	£21 (d)
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
Super Art	£43 (d)
PAGEMAKER	£39 (d)
3D ZICON	£21 (d)
PAINTPOT	£21 (d)
DATABASE	£21 (d)
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£52 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£52 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb	£37 (d)
STARdataBASE A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW.	£49 (d)
MASTERFILE II Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T)	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0 New version of VIEW compatible with B+ complete with a printer driver generator.	£56 (c)
Hi-VIEW Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text.	£36 (d)
VIEWSPELL Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words.	£29 (d)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper.	£9 (d)
DOT PRINT PLUS Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP.	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
WORDEASE A 16K rom based utility for WW+	£24 (d)
SPELLCHECK III A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc.	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor.	£37 (d)
VIEWPLOT A disc based plotting program. (To be released soon).	£22 (d)
INTERSHEET The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc.	£39 (d)
INTERCHART Graphics package for Intersheet	£27 (d)
ULTRACALC BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc.	£52 (d)
QUICKCALC A disc based economically priced spreadsheet package (40 or 80T Disc).	£14.50(d)
MINI OFFICE II (for BBC B) A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T)	£14.75(d)

LANGUAGES

META ASSEMBLER Multi processor Assembler full details on page 8	£145 (c)
TEAM DISASSEMBLER	£145 (b)
ACORN 6502 DEV. PACKAGE A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor.	£43 (d)
MACROM A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory.	£33 (d)
ACORN MICRO PROLOG Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly.	£62 (d)
ISO-PASCAL Acorn's full implementation of International Std Pascal on 2x16K roms.	£48 (c)
ISO PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL A fast P-code compiler and stand alone utility (40 or 80T).	£36 (d)
BCPL	£46 (c)
BCPL CALCULATIONS Supports floating point, fixed point and fast integer calculations on BCPL	£17.50 (d)
BCPL STAND ALONE GENERATOR	£39 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT A frame based authoring system from NPL for interactive computer tutoring. Disc based	£52 (c)
MICROTEXT PLUS Extended Features incl extra memory, control of external devices etc. Rom based.	£229 (b)

COMMUNICATIONS

TERMULATOR Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations.	£25 (d)
COMMSTAR A highly popular communication rom suitable for all general purpose applications (specify B or Master)	£28 (d)
COMMUNICATOR A full 80 col VT100 emulation program with easy to follow screen menus.	£49 (d)
DATABEEB A variety of facilities for use with WS2000 Modem	£26 (d)
DS1 DISC Special utilities for use with WS2000	£10 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£22 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
EXMON II	£23 (d)
HELP II	£25 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£22 (d)
PRINTMASTER	£24 (d)
DUMPMASTER supports about 40 printers	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
BILLBOARD	£18 (d)
STUDIO EIGHT	£19 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
CC SPEECH ROM	£28 (d)
CC SPEECH ROM to Text Rom	£34 (d)
ACORN SPEECH ROM	£15 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

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9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

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An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

DRAWSTICK
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. **Cass £8 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

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Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

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Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

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6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

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8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres.
Prog Cass £10 (d)
Audio Cass £5 (d)
Book £8 (d)

OPEN LOGO
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

VU-TYPE
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

GENERAL

GAME CORE
Provides information and intelligence routines for writing board games. **Cass £9 (d)**

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II **Disc £16 (d)**
(Specify if for Master).

BATTLEFIELDS **Cass £8.50 (d)**

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation.
Disc/aud/EC £16 (c)
Book £5.95 (d)

A VOUS LA FRANCE
A home study aid for anyone learning French.
Cass/EC £12 (d)
Book £5.25 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

PRINTER ACCESSORIES

EPSON ACCESSORIES:	
Interfaces:	
8143 RS232	£28 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8148 RS232 + 2K	£57 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£37 (c)
FX80/80 + Paper Roll Holder	£17 (c)
LX80 Tractor Feed	£20 (d)
LQ800 Tractor Feed	£44 (b)
LQ1000 Tractor Feed	£49 (b)
SHEET FEEDERS:	
8338 LX80	£49 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
8330 RX80 +	£129 (b)
LQ800	£129 (b)
LQ1000	£159 (b)
Ribbons:	
RX/FX100/100 + . FX105	£10 (d)
RX/FX80/80 + , FX85	£5 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)
Dust Covers:	
FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	**£7.50 (d)**
KP910	£7 (d)
HITACHI 672 Plotter	
Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)
TAXAN CANON Accessories:	
RS232 + 2K buffer	£78 (d)
Ribbon	£6 (d)
JUKI 6100	
RS232 Interfaces	£65 (d)
Tractor Feed	£129 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£182 (a)
BROTHER HR15	
Daisy Wheel	£18 (d)
Tractor Feed	£90 (a)
Ribbon (Carbon/Nylon)	£3.00 (d)
Sheet Feeder	£182 (d)
Keyboard	£135 (a)
Printer Leads:	
BBC Parallel Lead (1.2m)	£10 (d)
BBC Serial Lead (1.2m)	£6 (d)
Other lengths can be supplied on order:	
IBM Parallel Lead (2m)	£12 (d)
PAPER & LABELS	
Plain Fanfold paper with micro perforations:	
2000 sheets 9½" × 11"	£13 (b)
2000 sheets 14½" × 11"	£18.50 (£4.50)
Labels/1000:	
Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

BBC SPARE PARTS

All Prices are Retail ex-VAT carriage code (d).

BBC & Misc:	
Keyboards	£52 (b)
Powers Supply	£52 (b)
Keyswitch	£1.75
Video ULA	£18
Serial ULA	£14
DNFS	£18
UHF MOD	£4.50
6502A CPU	£6.50
65CO2 CPU	£12
6522 VIA	£3.50
6522A VIA	£5.50
LM324	£0.45
74ALS 245	£5
88LS120	£3.00
BBC PLUS:	
PAL16REN	£13.50
64K × 4 DRAM	£8.50
6512A	£12.50
SAA5050	£9.00
6845SP	£6.50
UPD7002	£5.00
DS3691	£3.50
7438	£0.40
74LSOO	£0.24
74LSO4	£0.24
74LS10	£0.24
74LS123	£0.80
74LS163	£0.75
74LS244	£0.80
74LS245	£1.10
74LS373	£0.90
74LS393	£1.00
BBC MASTER:	
1-Mbit ROM	£39
MSI CHROMA IC	£13.50
65SC12P-2	£12.50

Look for the holly symbols and then see page 5 for our special XMAS offers.

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

- NS32016 8MHz Main Processor & 32081 FP processor.
- 20 Mbyte Winchester and one 80T Ds floppy drive.
- A detachable keyboard Hi Res RGB Monitor.
- 4Mbyte of on board Ram as standard.
- Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
- Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
- **Phone for detailed leaflet.**

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to the BBC Computer.

- Interfaces with the BBC through the tube connector.
- NS32016 6MHz CPU &. 32081 FP processor.
- 1Mbyte Ram as standard.
- Packaged software includes all the languages and utilities supplied with the ACW Work Station.
- **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (non-Acorn) for the Co Processor for 10Mhz operation to enable faster processing. It can be fitted at no extra charge if ordered with the Co Processor.

A list of software available for the 32 bit processors is available on request.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

- 10 Mhz 80186 *DOS PLUS.
- GEM Write & GEM Draw.
- 'WIMP' Environment with high quality Mouse.
- Runs many 'IBM' programs — even 'Flight Simulator'!
- Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

- Built-in character font generator.
- Built-in view printer driver.
- Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- True bold print as well as double width.
- 12 character pitch as standard.
- Fully variable pitch and line spacing.
- Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
- **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
- **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

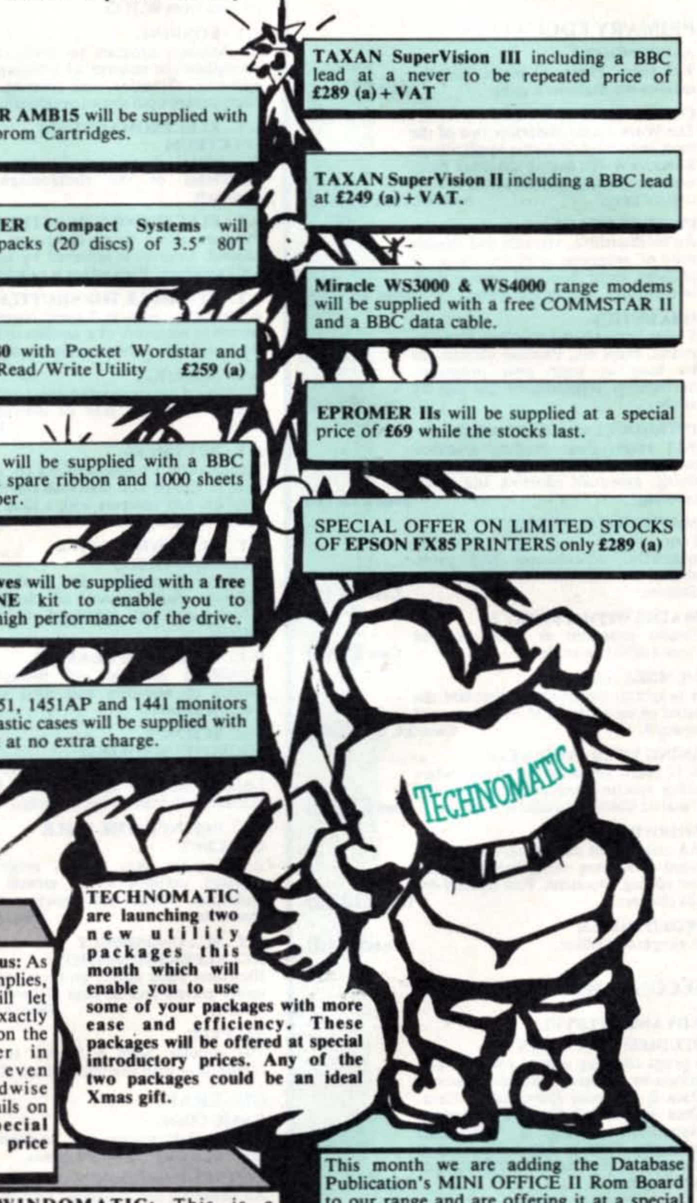
NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

Special Xmas Offers

During this festive season of 'goodwill etc' we are offering a selection from our range of equipment either at a special price or including added value in the normal price. All offers will be valid for orders received upto 10th January.



BBC MASTER AMB15 will be supplied with two Acorn Eprom Cartridges.

BBC MASTER Compact Systems will include two packs (20 discs) of 3.5" 80T DSDD Discs.

Multiform Z80 with Pocket Wordstar and MS/PC DOS Read/Write Utility **£259 (a)**

Every printer will be supplied with a BBC printer lead, a spare ribbon and 1000 sheets of fanfold paper.

All floppy drives will be supplied with a **free FLOPPICLENE** kit to enable you to maintain the high performance of the drive.

Microvitec 1451, 1451AP and 1441 monitors supplied in plastic cases will be supplied with a swivel stand at no extra charge.

TAXAN SuperVision III including a BBC lead at a never to be repeated price of **£289 (a) + VAT**

TAXAN SuperVision II including a BBC lead at **£249 (a) + VAT.**

Miracle WS3000 & WS4000 range modems will be supplied with a free **COMMSTAR II** and a **BBC** data cable.

EPROMER IIs will be supplied at a special price of **£69** while the stocks last.

SPECIAL OFFER ON LIMITED STOCKS OF **EPSON FX85** PRINTERS only **£289 (a)**

TECHNOMATIC are launching two new utility packages this month which will enable you to use some of your packages with more ease and efficiency. These packages will be offered at special introductory prices. Any of the two packages could be an ideal Xmas gift.

WYSIWYG Plus: As the name implies, this utility will let you print exactly what you see on the screen either in BASIC or even within Wordwise plus. Full details on page 7. **Special Introductory price £19(d)**

WINDOMATIC: This is a VIEWSHEET window editor, designed to get the best from Acorn's powerful spreadsheet program. It provides a quick and easy way to configure on the screen and printer allowing complicated documents. Full details on page 9. **Special introductory price £15 (d).**

This month we are adding the Database Publication's MINI OFFICE II Rom Board to our range and are offering it at a special launch price.

MINI OFFICE II Rom Board includes four 32K roms that provide powerful and fast wordprocessing, spreadsheet and database facilities and utilities for communications, graphics and label printing. Compatible with all of Acorn's filing systems and shadow ram. Easy to instal. **£48 (c).**

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Orders welcome from
government depts &
educational establishments.

All prices ex VAT.
Prices are subject
to change without notice.

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(d) £1.00

40 80
TECHNOMATIC

TS 400

40 80
TECHNOMATIC

PD 800

PD 800 P

P2041 HT

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

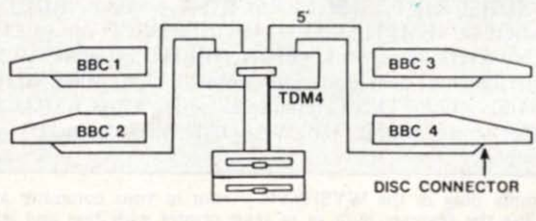
- P20HD Stand alone.
- P204HP With a single floppy housed in a plinth version case.
- P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
- TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

ALL TECHNOMATIC DRIVES NOW CARRY A TWO YEAR WARRANTY

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)
TDM2 Dual Unit (2 computers)

WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highly popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data between the computers. (Not recommended for use with randon access files).

3M FLOPPY DISCS

FREE Clock/calculator with every 5 boxes of 3M discs purchased.

Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs. **While offer lasts discs will be supplied at specially reduced prices.**

FLOPPICLENE Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

Look for the holly symbols and then see page 5 for our special XMAS offers.

TECHNOMATIC

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MODEMS

MIRACLE WS4000

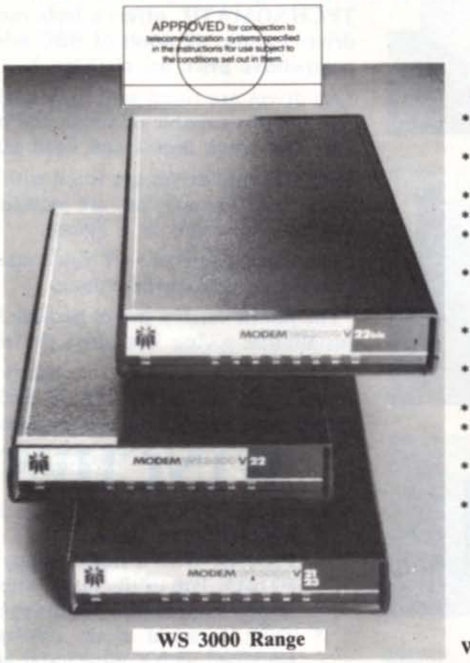
- A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- Plain English commands make it simple to use, even for the first time user.
- Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- Equalisation model in V23 for line-noise filtering.
- Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

- A comprehensive manually switched 'World Standard' modem.
- Competitively price with a capability to be upgraded for various options.
- BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).

- SK1 chip set for computer control.
- User port cable.
- Auto dial Board.
- Auto Answer Board.
- DS1 disc for auto dial facilities on Commstar.


APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.
MODEM V22bis
MODEM V22
MODEM V21 23

WS 3000 Range

Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.

Please see page 2 for prices

MIRACLE WS3000 RANGE

- A professional range of intelligent modems with full BABT approval.
- Auto Answer and Auto Dial facilities installed as standard.
- HAYES protocols implemented.
- Pulse or DTMF 'tone' dialing.
- Plain English command structure simplifies the use of the modem.
- Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- A line sharing facility to differential between data and voice calls.
- Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- Equalisation mode for line noise filtering.
- Internal battery back up for storing 63 names, numbers and default settings.
- Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

includes a FREE Pocket Wordstar package

- Multiform Z80 will run most CP/M 2.2 formats on the BBC.
- 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
- 8271 allows single density CP/M formats whilst 1770 DFS allows both single and double density CP/M formats. Single or dual drive, 40 or 80 track format and SS or DS drives can be used providing the CP/M format matches.
- Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

WYSIWYG PLUS

NEW

This new screen/printer utility not only allows you to see on the screen exactly how the text is going to appear on the paper when printed but also simplifies the printer control codes that you need to use to get the different effects.

WYSIWYG+ can be used in BASIC or from within the popular word processor WORDWISE plus.

The printer commands have been simplified to meaningful words so that the user does not have to either remember or keep referring to the printer manual and try to decode the commands to VDU format. For example: *ENGLARGED will display enlarged text on the screen and send the appropriate command to the printer to print in enlarged mode.

Some of the features you could see in WW+ or from BASIC include:
*SUBSCRIPT, *SUPERSCRIPT, *ENLARGED, *BOLD, *EMPHASISED, *CONDENSED (up to 132 characters on screen), *PICA, *ELITE, *GRAPHICS (design your own logos and symbols), *UK, *FRENCH, *US, *TELETEXT (character sets), *BACKSPACE (for overprinting), *DOWNLOAD (new characters or fonts).

Simply plug in the WYSIWYG+ rom in your computer and utilise the features built in to your printer with ease and least bother to produce the results you know are possible but not so simple to achieve. No other single package offers this much flexibility and simplicity to get the best from your printer.

WYSIWYG+ rom is supplied with a comprehensive manual.

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EPROMER III
Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.

The single rail eproms handled by the EPROMER III are:

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike.

The main features of the programming software are:

- * Device, function and voltage selection from the computer keyboard.
- * Continuous display of the options selected.
- * All eproms upto 27512 (64K) programmed in single pass.
- * Automatic Intelligent identifier support for eproms able to respond.
- * Selectable programming voltage 25/21/12.5V
- * 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
- * Serial port protocols supported.
- * Intel HEX, Motorola S, HEX and ASCII protocols supported.
- * DFS, NFS, ADFS and Rom Filing System Supported.
- * BASIC/Machine Code programming using RFS.
- * Powerful editor with input in HEX or ASCII.
- * Full editable 64K file.
- * Block move of data within the address range.
- * User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- * Multiple loading for ROM Filing System

EPROMER III interfaces with the BBC through the 1 MHz bus, has a mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 128 (2716, 2732, 2764, 27128):
PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

MICROPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micropromer program the device.

- * Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
- * Comprehensive error reporting and checking.
- * Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
- * Support for DFS, ADFS and cassette filing systems.
- * Edit data in Hex or ASCII.
- * Total control via software, no switches to worry about.
- * Supplied with user manual and software on diskette.
- * MPROMER simply plugs into the EPROMER II ZIF socket.

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc): updates soon for most of Meta processors.

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

BOOKS

No VAT Carriage Code (c)

LANGUAGES

6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPL User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45

BBC MICRO GUIDE BOOKS

BBC User Guide Acorn	£15.00
BBC Plus User Guide	£15.00
Drawing your Own BBC Programs	£6.95
Inside Information	£8.95
Math Prog in BBC Basic	£7.95
Toolbox 2	£10.95
VIA 6522 Book	£4.50

PROGRAMMING/UTILITY

Advanced Sidewise Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Advanced User Guide	£12.50
Applied Ass./Lang on the BBC	£9.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC ROM	£9.95
Beginners Guide to W.P	£7.95
View 3.0 User Guide	£10.00
Viewstore	£10.00
Viewsheet	£10.00
Wordwise Plus	£9.95

SOUND & GRAPHICS:

Mastering Music	£6.95

DISC DRIVE SYSTEMS:

Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA

APPLICATIONS:

Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75

PROFESSIONAL SOFTWARE

Wordstar made easy	£16.95
Introduction to Wordstar	£17.95
Wordstar Handbook	£11.95
dBase-II for the first time user	£16.95
Understanding dBase-III	£22.95
Multiplan Made Easy	£18.95
Multimate Complete Guide	£16.95
ABC of LOTUS 123	£17.45
1-2-3 for Business	£16.95
Adv Tech in dBase II/III	£22.95
Mastering CP/M	£17.95
CP/M Bible	£16.50
Introducing CP/M on BBC & Z80	£9.95
MS/PC DOS Prompt	£10.95

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NOVACAD

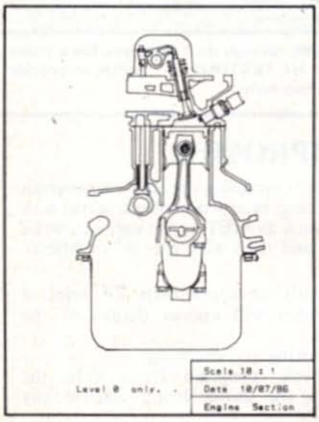
Computer Aided Draughting for the BBC Micro

> *“The Novacad system is a thoughtfully designed piece of software requiring a minimum of manual bashing so that real results are possible with just a few hours work.”*

> *“Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, “the best on the market”.”* **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.



MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

The major features of NOVACAD are:

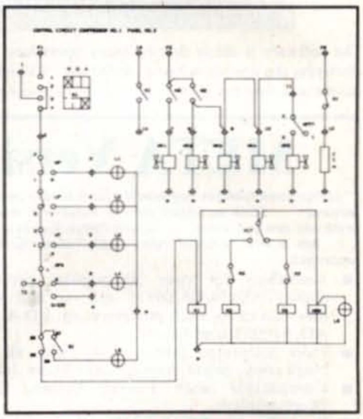
- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique facility to output to any BBC compatible plotter.

NOVACAD

is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard. Tracker Ball or a Mouse.



OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

WINDOMATIC

All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in upto 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of recitifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.
The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.
The program is compatible with BBC Master, B+ and 6502 and Turbo second processors. It can be entered from VIEWSHEET by use of function keys or it may be run by loading a previously saved window configuration from disc. The program is supplied on a disc with a comprehensive manual.

Professional aid for assembler programmers

NIGEL HUNTER recommends ADE Plus, an upgraded version of System's machine code development package.

Product: ADE Plus
Price: BBC B, B+ version £52.90
Master Compact version £48.30
Master 128 version £56.35
Supplier: System Software, 12 Collegiate Crescent, Sheffield, South Yorkshire.
Tel: 0742 682321

ADE Plus is a sophisticated machine code development package – an upgraded version of the original released three years ago.

The software supplied includes a simple text editor, macro assembler, linker, debugger and a symbolic disassembler.

It is available on two 16k roms for the Model B and B+ along with a 5.25in DFS format utility disc. Master 128 users can buy a 32k rom cartridge that is supplied with a 5.25in ADFS format disc.

ADE Plus can also be supplied on a 3.5in ADFS disc for the Master Compact, where it would be loaded into 32k of sideways ram.

The main elements of the package are accessed from the memory management unit (MMU), which is entered by issuing a *ADE command.

If the machine does not have a real-time clock you will be asked to enter the time and date. The main prompt is similar to that used by View but it also includes the time.

A list of system information is then displayed which includes the total quantity of ram available and the size of the various buffers. This information can be displayed at any time with the STAT command.

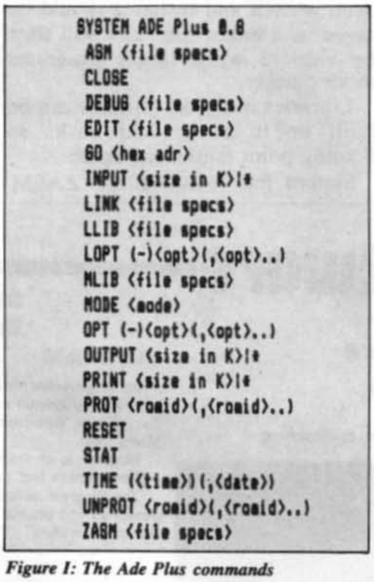
At this stage you may enter either an ADE Plus command as shown in Figure I, or a star command.

If an unrecognised command is entered the MMU attempts to *EXEC a text file of that name. This is very useful since you could set up buffer sizes, assemble and link by issuing one command.

The original version of ADE would not assemble on a Master 128 if a 6502 second processor was switched on. And to make things worse, all that sideways ram was wasted.

ADE Plus corrects these problems by noting how much sideways ram is available and whether a 6502 second processor is being used.

Some of the ram is then assigned to workspace use with the remainder split up into three buffers.



```
SYSTEM ADE Plus 0.0
 ASM <file specs>
 CLOSE
 DEBUG <file specs>
 EDIT <file specs>
 GO <hex adr>
 INPUT <size in K>|*
 LINK <file specs>
 LLIB <file specs>
 LOPT (-)<opt>(,<opt>..)
 MLIB <file specs>
 MODE <mode>
 OPT (-)<opt>(,<opt>..)
 OUTPUT <size in K>|*
 PRINT <size in K>|*
 PROT <romid>(,<romid>..)
 RESET
 STAT
 TIME (<time>)(;<date>)
 UNPROT <romid>(,<romid>..)
 ZASM <file specs>
```

Figure I: The Ade Plus commands

The input buffer is used to hold the source code, the output holds the object code while the third is a printer buffer – its speed advantages are obvious.

It is possible to use the printer buffer with other products such as View but you'll need to buy the technical manual to find out how.

You are advised to change the sizes of these buffers to allow for very large source files, no printer in use and so on. If you keep an eye on the buffer sizes you can keep assembly times down to a minimum.

The main text editor is supplied as part of one of the roms and operates in Mode 3.

There is also a Mode 7 version on the utilities disc which will be useful to those people who are forced to work with the poor resolution on most television sets.

Although it is relatively simple, the editor provides enough facilities to allow you to create and modify source code without any real problems and does have one nice feature worth a special mention.

If you place the text cursor on a JSR line and press the GOTO LABEL function key, the cursor will move to the subroutine definition. A function key strip is provided for use with the editor.

The 6502/65C02 series assembler invoked by ASM is superb and has many advantages over other assemblers for the BBC Micro. It will assemble from disc or directly from the input buffer.

It is also incredibly fast – almost certainly the fastest around.

Numbers can be given in decimal, binary or hexadecimal and the only reserved word is the letter A meaning labels such as X and Y are permissable. It has a comprehensive set of data directives and a similarly useful set of pseudo-ops covering such things as printer output and operating system calls.

Conditional assembly may take place and there are also REPEAT . . . UNTIL and WHILE . . . WEND loops.

It is possible to assemble without generating any object code to perform a quick syntax check and other source files may be merged in or

→

From Page 93

chained during assembly.

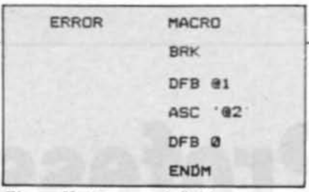
A macro facility has been provided – a macro is a sequence of assembly language statements grouped together under a single name which will allow you to create shorter and more readable source programs.

Whenever the macro name is used as an opcode the whole sequence of statements will be assembled.

A sequence may be defined at the start of the source program using the MACRO and ENDM pseudo-ops, or it may be loaded in from a disc-based library. A macro may be used with up to nine parameters, each being either a string or a number. For example, you could define a macro called FX that would require three numeric parameters.

As well as being able to perform sub-string operations on parameters, you can also read their lengths.

Unlike the original version of ADE, it is possible to nest macros, subject to the availability of memory. An example of a macro definition is shown in Figure II. The @ characters represent the parameters while the single quotes indicate that the second parameter is a string. You could then include, for example, the line ERROR 65, STACK OVERFLOW in your source code.



```
ERROR       MACRO
            BRK
            DFB @1
            ASC '@2'
            DFB 0
            ENDM
```

Figure II: A macro definition

The assembler can produce relocatable non-executable linker files that can be strung together using the linker.

These are smaller than equivalent source files and they allow you to speed up the generation of large object files.

As each chunk of a program has been written and tested it should be saved as a linker file. You will then be able to write larger programs more quickly.

Libraries of useful routines can be built up to cover such tasks as floating point maths and so on.

System has included the ZASM command in the MMU but does not supply the actual Z80 assembler yet – it's a possibility if there is a demand for one.

A nice debugger (similar to System's Spy) is included on the disc. Two versions are supplied, one for use in sideways ram, the other for main ram.

Once it has been loaded in, the former may be called up from the MMU by using the DEBUG command.

Although it has one or two omissions (no real-time memory display for example), it can do most of the things that are required. There is also a symbolic disassembler on the disc.

The final link in the chain is a well-written manual. The whole package is very flexible and is a pleasure to use. I'm sure it would be of great use to any serious assembler programmer.

By using ADE Plus to the full the professional could soon recoup the initial cost of the package. I highly recommend it. ■

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Opening new windows

– and Icons, Menus and Pointers. IAN WHITMORE examines the makeup of Max the WIMP

Product: Max
Price: £19.95
Supplier: Advanced Memory Systems, 166/170, Wilderspool Causeway, Warrington, WA5 6QA
Tel: 0925 413501

ADVANCED Memory Systems' recently released desktop front end called Max represents a backward glance to its original fame with the BBC Micro and AMX Art. Much of the stimulus for the production of AMX Art must have come from earlier versions of Gem or Gem Paint seen on other computers.

Now Peter Elliott and AMS have got together again to produce a good emulation of the Gem theme on the BBC series of micros.

Max comes on a 16k rom with a 21 page manual which contains clear instructions for rom insertion into B, B+, Master and Compact micros. Using WIMP (Windows, Icons, Menus and Pointers) techniques Max can list and enter roms present in your machine, and can catalog and run files from disc.

Once installed Max is entered by pressing *f9*+Break or typing *Max which both utilise the DFS, or *f8*+Break which uses the ADFS.

At this point it is possible to select how pointer movement will be controlled using the function keys – *f3* for keyboard cursor keys, *f4* for joystick, *f5* for AMX compatible mouse or *f6* for trackerball.

On entry, the desktop displays the control panel (Figure I) in the centre, from which ink and paper colour are selected. In the top right hand corner of the control panel six disc drives are represented (0-5), each with an A, a D or a blank under them. By clicking each drive (placing the pointer over the icon or graphic symbol and pressing the execute button), it can be set for DFS (D) ADFS (A) or deselected (Blank).

Beneath these drives the time and date are displayed (Master only), and the screen mode called on exit from Max and the keyboard repeat rate are set. Clicking over CONTINUE removes the control panel.

On the right of the desktop are three groups of icons, the uppermost representing the same six disc drives. Clicking over any disc drive will create a window on the desktop, in which will be displayed a catalog of the disc (Figure II). While the disc is being accessed the pointer changes to a collection of ZZZzzz, simulating the noise of disc access!

At each corner of the frame surrounding the disc catalog window is another icon. Top right and bottom left icons control the scrolling of the contents of the window, up/down and right/left respectively. The top left icon, OFF, switches the window off whilst the bottom right controls the position and size of the window.

Pressing execute when over this icon, and holding it down when moving the pointer allows the window size to be changed. The same manoeuvre using the move button will move the whole window around the screen.

Several drives may be catalogued in turn, each new window partly covering its predecessor.

The most recently called window is active, indicated by the presence of the

→

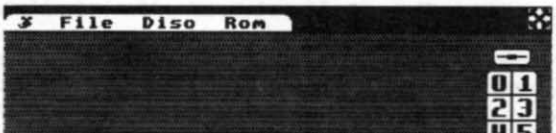


Figure I: The control panel

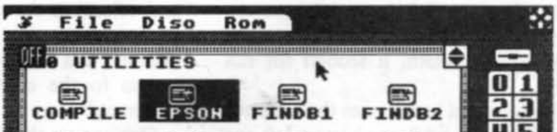
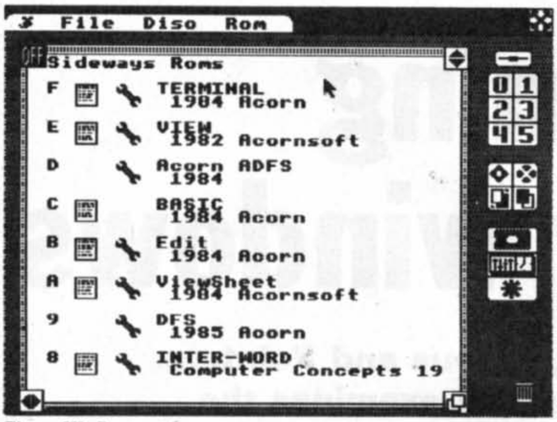
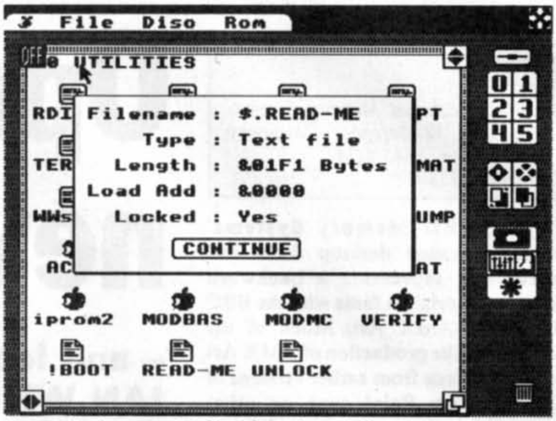


Figure II: Example disc catalog



Sideways Roms
F TERMINAL 1984 Acorn
E VIEW 1982 Acornsoft
D Acorn ADFS 1984
C BASIC 1984 Acorn
B Edit 1984 Acorn
A ViewSheet 1984 Acornsoft
9 DFS 1985 Acorn
8 INTER-WORD Computer Concepts 19

Figure III: Rom catalog



Filename : $.READ-ME
Type : Text file
Length : &01F1 Bytes
Load Add : &0000
Locked : Yes
CONTINUE

Figure IV: An expanded file information window

From Page 95

control icons and the border to the window. Only the active window may be altered and accessed for further disc usage.

An inactive window is made active by clicking over part of it. Within each disc window the files are displayed with one of eight icons representing the file type.

These represent Basic and machine code programs, text files, pictures, icon sets, linked program files, rom images and ADFS directories.

If a file is selected by clicking over it, it is displayed in inverse. If then clicked again, Max will try to CHAIN it, *RUN it, or enter View and load it, as appropriate.

Links, icons, pictures and roms are unaffected, while ADFS directories are catalogued.

The middle group of icons on the right of the desktop are window control icons. The top left icon enlarges the active window to maximum size – one click for full width, a second for full height.

The top right icon closes the window, switching it off, while the bottom left one swaps the two last active windows. The bottom right icon brings the bottom window to the top of the stack, making it the active window.

The lowest group of icons allows access to the roms contained in the micro, producing a window similar to that of the disc catalog (Figure III). Access to the control panel and star commands are also supported in this group.

At the top of the screen are four further icons, mouse, file, disc and rom, each of which will reveal a pull down menu if execute is pressed and held while the pointer is over the icon.

Items in the menus are selected by moving the pointer (with execute still pressed) down onto the item required and releasing the execute button. The mouse menu displays the version number and author's name and gives access to the control panel and star commands.

Options on the File menu relate to a file previously selected from a disc catalog. Thus individual files can be run, locked, unlocked, renamed and deleted and further details of the selected file can be displayed in a secondary window (Figure IV).

The Disc menu displays the current disc title and its drive number, while it is also possible to choose to have disc files displayed in alphabetical order or by file type.

The rom menu repeats the action of the rom icon by listing the roms present either as chips or in sideways ram and also controls the amount of detail displayed.

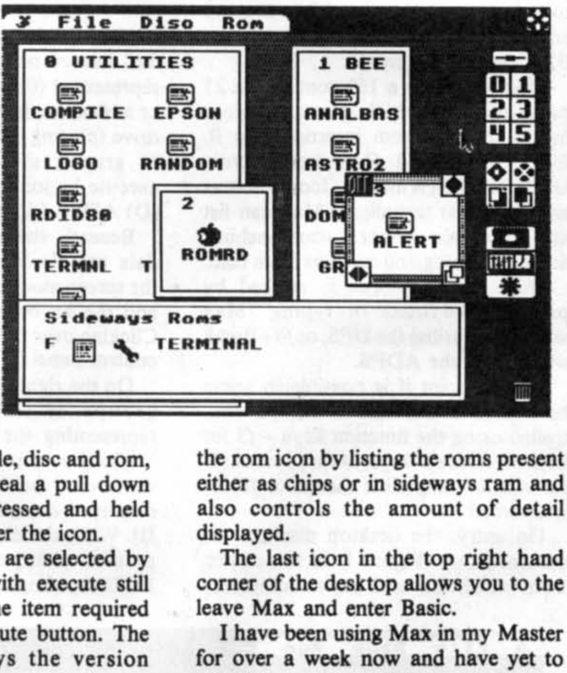


Figure V: Multiple windows overlayed

The last icon in the top right hand corner of the desktop allows you to the leave Max and enter Basic.

I have been using Max in my Master for over a week now and have yet to experience any problems or clashes. However, I can confirm the one warning in the manual – when you try to run some protected software from within Max, it doesn't run properly.

Max works well with both DFS and ADFS files and I have been able to try it in both a standard B (on a rom expansion board) and in a B+ with no ill effects whatever.

With Advanced Memory Systems' reputation, the multiple window overlays (Figure V) and the low cost, this must be a good buy and I will continue to use it as long as the editor lets me keep it. ■

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A drum kit like Ringo's

MIKE COOK takes a transducer and comes up with a melody maker.

DID you ever want to be a famous drummer? Another Ginger Baker or Ringo Starr? Only two things stopped me – the absence of instruments and a conspicuous lack of talent. This month I hope to be able to put the former, if not the latter, to rights as we see how to turn your BBC Micro into a drum kit.

To get yourself a drum interface involves two problems: The first is to enable the computer to sense when you have hit the drum and the second is to make some sound when it does.

Both problems can be tackled in several different ways so let's start with the sensor.

As Ginger Baker said in the famous Monterey pop festival film, "Some drums are for bashing and some drums are for crashing," but whatever you do with your drums the first job is to get some drum sticks.

When I went down to my local music shop and asked if they had any drum sticks I was faced with a huge choice.

The sticks available ranged from lightweight wood at £1.50 to carbon fibre at over £25. It seems it is all a matter of personal choice, so I chose the cheap ones.

We will use the drum sticks to hit something, but to feed the hit information into the computer we need a transducer to convert the mechanical thump into an electrical signal.

To do this we can use piezo-electric transducers. These are small sandwiches of a piezo-electric substance between two plates.

Contact to the plates can be made by soldering a wire on to each plate on one side of the transducer – the general arrangement is shown in Figure I.

Piezo electricity is an interesting phenomenon so a few words about it here will not go amiss.

Most materials exhibit electrostriction, which means they expand when placed in an electric field.

The electric field places a mechanical strain on the material owing to its deforming the crystal structure of the atoms in the material.

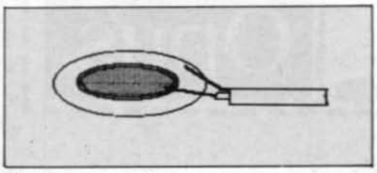
Figure I: A transducer

However the reverse effect, that of an electric field being produced when a strain is applied, is usually not present.

What it comes down to is that if you apply a strain (thump it) you will get an electric voltage out of it.

This effect has been used in cigarette lighters and gas cookers for years.

There are several ways to use the transducer. You can tap it directly with your fingers, mount it under something that you hit or mount it on something that is hit.

In this way we can arrange our surrogate drum to have a "feel" best suited to you. The amount of force eventually applied to the transducer will determine how much extra electronics you need to hang around it.

If you look at professional electronic drum kits you will see that the head is made from a rubber pad. Sometimes this is attached to a wooden base but more often it is held loosely to give a floating head.

If you are handy you could try making your own set like this. One famous electronic drum kit maker has hexagonal drum heads. However, I found I could get good results attaching it to a cardboard box or an empty tin.

Mounting the transducer can be a bit of a problem as it needs to be in firm contact with the object you are going to hit.

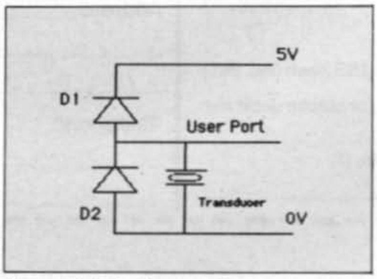

Figure II: A simple connection

I found that silicon rubber of the type sold as a bathroom sealant is the best. It has the advantage over conventional glue of being removable once set, so you can experiment with the best position for the transducer.

Most force is applied when you hit the transducer directly, so to preserve its life you had better use just your fingers. If you do this a simple set-up like that shown in Figure II will suffice.

Here it is connected directly to one of the bits on the user port. The diodes are to prevent the voltage excursions exceeding the limits of the power rails, thus preventing any damage to the user port.

The trouble with a direct connection like this is that the voltage produced will have a waveform similar to that from a microphone.

I used an oscilloscope to try and see a typical waveform but there were many different ones depending upon how it was struck. However, most of the time there is a sharp rise in voltage when it is first hit, followed by a decay and then further peaks as the shock waves bounce around in the transducer's mount.

Therefore it is possible to get multiple triggerings for a single strike. To make matters worse however the initial peak lasts only for about half a microsecond.

If you were using Basic to read the transducer it is possible that you would miss the peak if it occurred during the loop back instruction. So what we need is some method of cleaning up the transducer's output to give a long clean pulse.

The best way to do this is to have the transducer fire a monostable – a circuit that produces a fixed width

THE BEEB BODY BUILDING COURSE

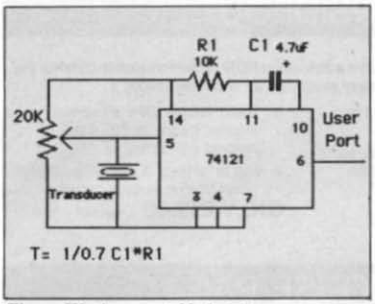

Figure III: A monostable interface

pulse on its output when triggered by an edge on its input.

The shortest time to ensure that a pulse is not missed should be about 5ms. The length of the output pulse is determined by a capacitor and resistor. The capacitor can have virtually any value but the resistor can only range from 2.5 to 40k.

Figure III shows the circuit to use and also the formula for calculating the monostable's pulse length. Also, making the pulse longer ensures that double triggering will not be so much of a problem.

The transducer is connected to the positive input which is a Schmitt input and will fire the monostable when a certain voltage is exceeded.

The variable resistor can be used to vary the sensitivity which it does by applying a fixed voltage to the input.

If this voltage is close to the threshold it will only take a small output from the transducer to fire the monostable, but if it is set right on the threshold you can get the monostable oscillating. If this happens just back the control off slightly until it stops.

In this case the diodes are not needed as the output impedance of the transducer is high and the input impedance of the monostable is low, making it very difficult to damage the monostable.

When you mount the transducer on the side of a box and hit the top you get a much lower signal from it. The same goes for wrapping it up in foam rubber and stretching leatherette material over it.

In these cases there needs to be a little more amplification of the transducer's signal. This is not so easy because the transducer's output is a high impedance and it behaves like a capacitor.

However, to the rescue comes the good old standby of the differential amplifier shown in Figure IV.

This is capable of very high gain but I have found that in all the mountings used for the transducer a gain of around 20 was quite adequate.

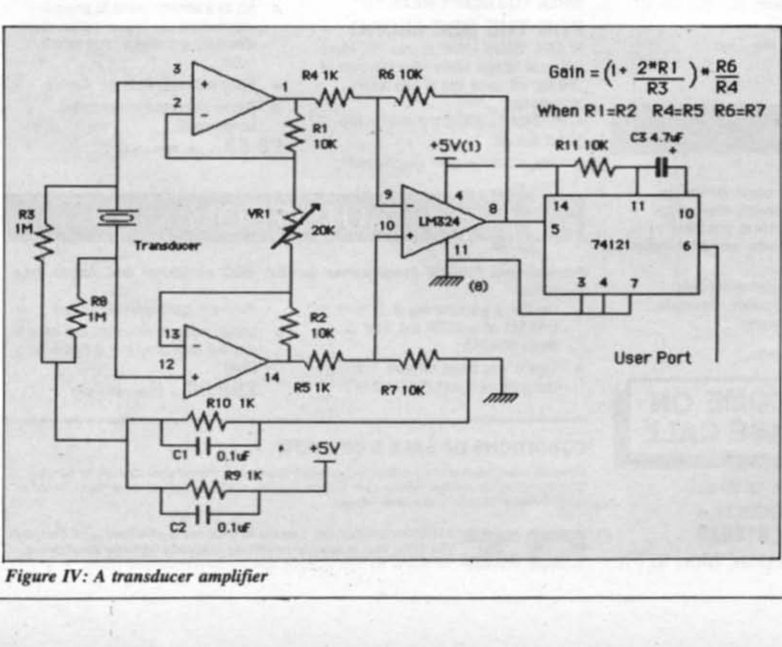

Figure IV: A transducer amplifier

Therefore the resistor VR1 should be made 20k giving a maximum gain of 20. If you find you need more gain then a fixed resistor in series with this control will increase it.

The total gain is the value of the resistors in kilo-ohms, therefore if you need a gain of 50 place a 30k resistor in series with the 20k potentiometer. The output of this is fed into the monostable as before.

The parts for this month's circuits are available as Body Build pack No. 38 and can be ordered using the form at the end of the article.

As there are many different ways you might like to use these circuits, each kit contains a small piece of veroboard to make up the circuit on.

If you only want the transducers

→

```
   10 MODE7
   20 PRINT"BEEB BODY BUILDING COURSE
"
   30 PRINT"Simple Cymbal and Drum"
   40 PRINT"Controled from the User P
ort"
   50 *KEY0 PROC_D|M
   60 *KEY1 PROC_C|M
   70 PRINT"Press any key to start"
   80 PRINT"or ESCAPE to use Function
 keys 0&1"
   90 A$=GET$
  100 ?&FE62=0
  110 ENVELOPE1,3,0,0,0,0,0,0,126,-4,
-2,-2,126,100
  120 ENVELOPE2,3,0,0,0,0,0,0,80,-2,-
2,-2,80,40
  130 ENVELOPE3,1,0,0,0,0,0,0,126,-3,
-3,-6,126,100
  140 REPEAT
  150 IF (?&FE60 AND 1) THEN PROC_C
  160 IF (?&FE60 AND 2) THEN PROC_D
  170 UNTIL FALSE
  180 DEF PROC_C
  190 SOUND &101,1,197,1
  200 SOUND &100,2,4,1
  210 ENDPROC
  220 DEF PROC_D
  230 SOUND 0,3,20,1
  240 ENDPROC
```

Listing I

Season's Greetings FROM

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- ★ Not limited to one device.
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From Page 99

these are also available separately.

You will need a transducer for each drum sensor you make and it can then be fed into the user port using the transition board and cable (Body Build packs 1 and 2).

Alternatively you can use a length of ribbon cable and an IDC (Insulation Displacement Connector) and tease out the appropriate connections.

Each transducer should be fed into a separate user port bit and the value of the bits can be read using ?&FE60.

Having derived a signal we need to do something with it. One option is to make the computer generate the sound using the built-in sound chip.

Some good percussion effects are possible with this chip, but producing the envelope statements can be quite fiddly and time consuming.

Listing I is my attempt at a simple cymbal sound on user port bit 0 and a drum on user port bit 1. I am sure they can be improved upon.

You do not have to have the drum to hear the sounds, as lines 50 and 60 program two function keys to call the sound producing procedure directly.

However, the program needs to be run first to define the envelopes. If you do this you will get the sound produced continuously until you press Escape as a user port reads a logic one when not connected to anything.

Being a hardware sort of a chap I prefer to generate the sound in a different way. I took the sound sampler project described in the first three months of 1986 and sampled a drum sound.

Then I used the transducers to trigger the sample replay. This is much more realistic, and I could also sample any other sound and have it produced on demand. The sound sampler kits are still available at the originally advertised price.

● *Have a very happy New Year and keep those soldering irons hot.*

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from the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

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TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

VIEW PRINTER DRIVER ROM

(Professional facilities for demanding users)

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticâted RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second

Continued ——————→

Mark II Light Pen

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor. The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Special Offer Price: £15

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price".
(Please write in for comprehensive details.)

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

– *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£58**
- *Acorn's 0.90 DFS Kit complete* **£52**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM comes a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£29**

CHRISTMAS GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5) £10 & £15 demominations and are an ideal answer when faced with that problem of what to give for that special Birthday-Christmas gift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive[What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin[What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

STAK-PAK

The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

Five twin Packs incl.
10 Cassettes Only: **£5**

FLOPPY HEAD CLEANER KIT

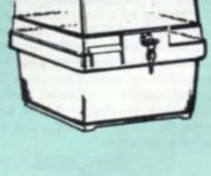
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

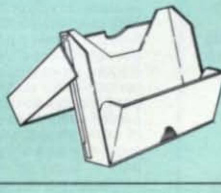
£8

LOCKABLE DISC STORAGE UNITS

Strong plastic case that affords real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● M35 - holds upto 50 discs	**£8**
● M85 – holds upto 95 discs	**£10**





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

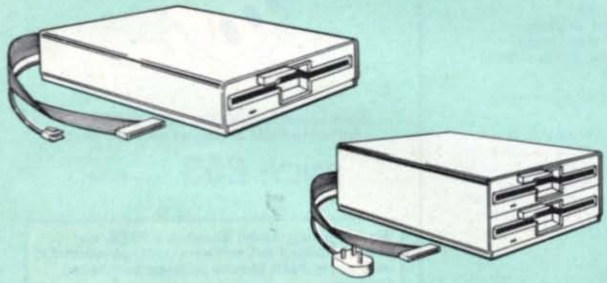
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate(extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives in Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

COMPACT DISC DRIVE CABLE
Single £9 Twin £12



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

- TWIN Disc Drive Case, complete with Power Supply & Cables **£39**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£10***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£12***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£17***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£17***
● *Hi-Density 1.6M D/S D/D for IBM*	***£32***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£20***
● *10 × 3½" D/D D/D 40/80 track Discs*	***£26***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- ***10 × M3 3½" D/S D/D 80 Track Discs £20***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs **£9***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs **£11***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs **£14***
- *3" Double Sided Discs **£3** each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	**S-S 80T**	**D-S 80T**
● Without Sleeves	**£49**	**£74**
● With Sleeves	**£50**	**£75**

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

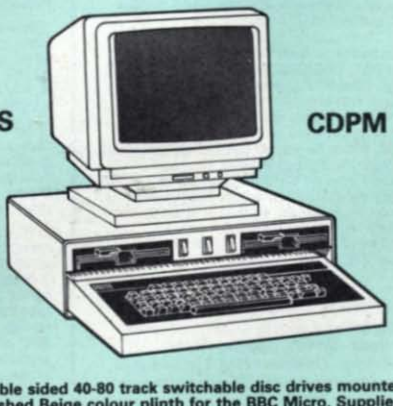
WATFORD's WINCHESTER DRIVES

● 20 Megabytes with ADFS	**£635**
● 40 Megabytes with ADFS	**£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

CDP 800S



CDPM 800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £210

CDPM 800S for Master £225
(Securicor Carr. £7)

EPSON NLQ ROM
for the BBC Micro

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80-100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80) ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set) Standard 'pica size') Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

(Hi-View compatible)

THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810-910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.
Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

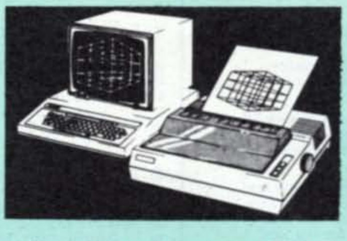
A 40 or 80 track (please specify) FONT Disc containing 9 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines(
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"(provides) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of ßGIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

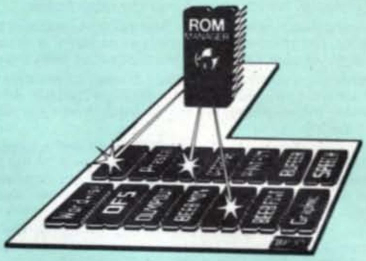
Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/ TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/ 400, Mannesman Tally etc.

Price including comprehensive manual

£25

ROM MANAGER



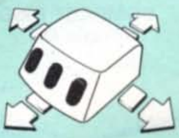
Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)

We are giving away, absolutely **FREE,** our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£42
AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse	£34
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£19
AMX MAX(A gem of desktop (ROM)	£17

RB2 MARCONI TRACKER BALL

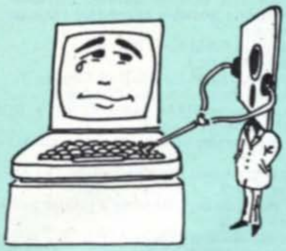
This popular unit is supplied complete with software.

Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC Publication's Popular Educational Software

Maths with a Story 1 (Cassette) 4 primary level maths programs	£10.95
Maths with a Story 2 (Cassette) 4 further maths programs	£10.95
Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs.	£19.95
WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
RELATIONSHIP: Science (Disc) O Level Biology program.	£14.95
BONDING: Science (Disc) O Level Chemistry program.	£14.95
ELECTROMAGNATIC SPECTRUM (8 Discs) O Level program.	£14.95
ELECTRONICS IN ACTION (Disc) O Level program	£14.95
NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	£20
ECOLOGY (Disc) O Level program.	£20
POLYMERS (Disc) O Level program.	£20
Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20
FOOD & POPULATION (Disc) O Level program.	£20
MICROTECHNOLOGY (Cassette) O Level program.	£6.95
A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	£17
DEUTSCH DIREKT! (Disc & Audio Cassette)	£20

NEW LAUNCH

THE BBC + MICRO ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

ROM-SPELL

"way ahead of any competition"

ENGLISH DICTIONARY
ROMSPELL

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP-M and MSDOS, namely Spellstar and has a speed-performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

BBC MICRO BUSINESS/ WORD/PROCESSING PACKAGE

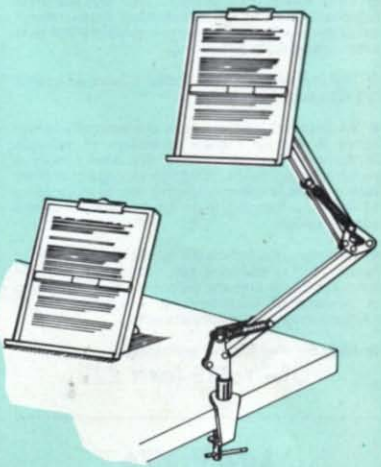
A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40-80 track double sided Disc Drives, Zenith Hi-Res green monitor, Panasonic KX-P3131 professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £899

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder#

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

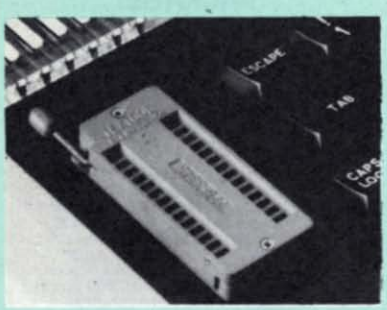
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

Complete System	**£11**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

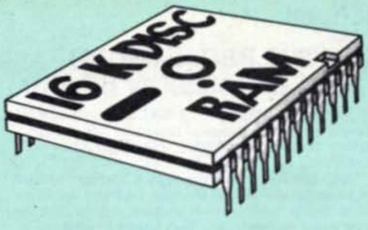
Key points to note about this new addition to the Watford range of products are(

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**



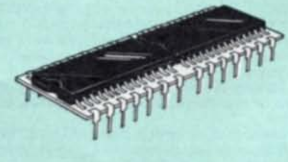
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected.
The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM.
Features available are:

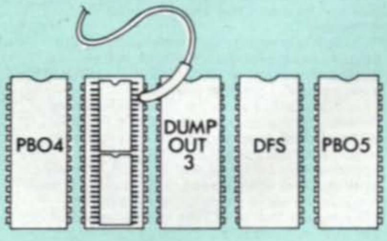
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

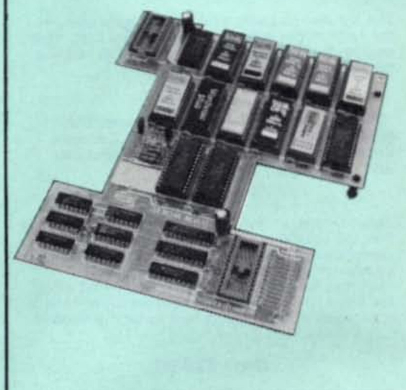
Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc[Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

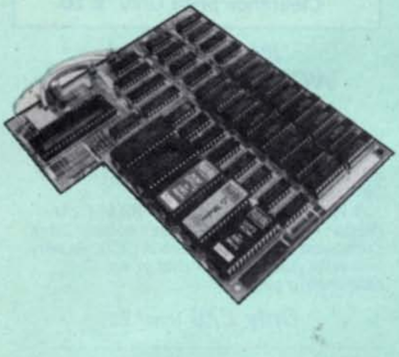
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* *£39*
- ROM/RAM card with 64k dynamic RAM *£52*
- ROM/RAM card with a massive 128k dynamic RAM *£80*

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* *£6*
- *16k Dynamic RAM for Upgrade* *£7.50*
- *Battery backup* *£3*
- *Read and Write protect switches* .... *£2 each*

Complete ROM-RAM board (all options installed) *£89*

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple "*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE Membership to MicroLink.*
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£99

APPROVED

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £87**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial-Auto Answer Board (non BABT)	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

APOLLO

APPROVED

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- FREE membership to MicroLink.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75**
(Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued ⟶

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£48**
CARETAKER Basic Utility	**£25**
Graphics ROM	**£23**
TERMI	**£27**
COMMUNICATOR	**£49**
SPEECH ROM	**£26**
Printmaster	**£24**

Wordwise **£25**

Wordwise plus

WORDWISE PLUS
£38

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET £38

INTER-CHART **ONLY: £26**

Inter-WORD

Only: £44

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

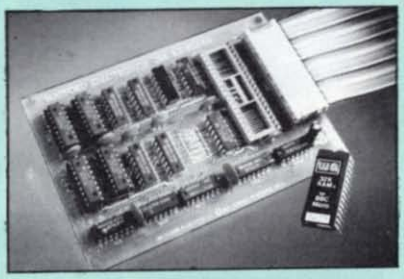
Only: **£39**

All Prices Exclusive of VAT

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B¿ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only(£59 (carr £2)

(Price includes a comprehensive manual and the ROM)

SPECIAL OFFER

Acorn's Speech Synthesiser
Package

Complete with manual in its original packaging

Clearance price Only: **£16**

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £79 (carr £2)

DATAGEM

Gemini's popular Database package
Only: £34

VIEW

VIEW WORDPROCESSOR 2.1	**£37**

VIEW 3.0 ROM

Price: Only **£56**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£12**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW-VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

MINI OFFICE II (tape)	**£14.50**

ARIES CORNER

Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM

ONLY **£16**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234-33383

النور

ARABIC ROM
for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

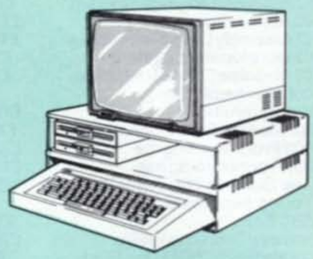
20, 40 and 80 column operation. Compatible with ASMO (449). English-Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
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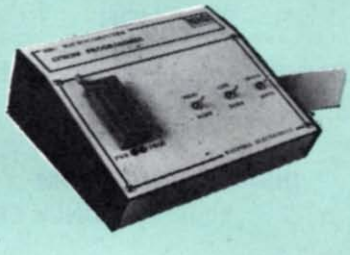

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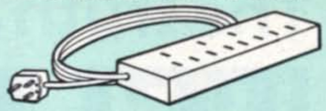

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MicroLink application form: Page 149

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BUSINESS MICRO USER

With cost a major factor

JO STORK weighs up an ideal minimum business system

WHEN you consider that the cheapest micro available – a heavily discounted marketing catastrophe – costs only £79.95 and the most expensive is almost 100 times as much, it's hardly surprising that many potential users are baffled as to what they need. It might therefore be helpful if we discuss what the minimum practical business system should consist of.

Before we start I need to make a couple of points. The first is to stress that what follows will not provide computer-aided design, fully exponentially smoothed stock control or other more complex tasks.

The second is that even if your system's specification appears most attractive when compared with its rivals, it must not become the automatic selection. If your hours are costed out, familiarity with a particular model – even if it lacks some features – will greatly affect the return on your investment.

Conversely, do not overlook excellent systems merely because you are unfamiliar with them.

To accommodate this familiarity element when choosing a system you can use an enlarged version of the form shown in Figure I. Criteria can be allocated the maximum scores indicated in the brackets. For instance a Bimbo spreadsheet may score only 2 out of 6, while an excellent Dos could gain 17 out of 20.

But if you are extremely familiar with this spreadsheet give it the full 3 marks in the familiarity column, making a total of 5. Similarly if you are new to the operating system the familiarity would score 0, leaving its total at 17.

Though some of the following categories may seem unimportant at first sight, I have ranked them in the order I consider to be of greatest importance.

● Operating System: Although the processor itself may seem to be the most important element, in practice I rank the operating system higher. Commands such as COPY A TO B are far easier to remember than jargon such as PIP B:=A:.

The ability to string commands together so that one or two words result in a large number of tasks being completed in the correct order is another important feature.

In your assessment you should also consider features such as Gem or windows. While extremely expensive on memory, they reduce the time needed by inexperienced users to work their minimal system.

● Languages available: If you intend developing a reasonable proportion of your own software, familiarity with the available languages and their sub-sets can outweigh the disadvantages of their complexities – so long as the facilities you require are provided.

On the other hand if you purchase a package do not forget that software houses will pass on their programming difficulties to you as higher prices. Consequently the BBC Micro scores well because of its fast flexible Basic.

● Disc drives: It is difficult to give hard and fast rules – the requirements of a word processing office are vastly different from those of a small workshop. You usually need dual drives capable of handling 720k of data unless your application is simple.

● Memory: In recent years the price of memory has tumbled so there is no excuse for trying to shoehorn systems into insufficient ram. Nevertheless it is still an important consideration, since although 512k is widely available on small and cheap micros, you do not always get the full benefit.

The 8 bit range of micros is notorious for offering large amounts of memory which can not be fully utilised because only 64k is addressed directly. The remainder requires either laborious operations to switch sections or the extra memory is merely a ram disc. While this greatly speeds up file access it still does not permit the use of larger programs.

● Growth potential: Your organisation's computer should have a life expectancy of at least three and preferably five or more years.

Some upgrading is perfectly valid, and the BBC Micro scores highly here. You are storing up a major bill for the future if replacement is the only option.

Following on from this, I strongly urge you not

→

Ravenskull
For the BBC MICRO ELECTRON

The Eerie Loading Screen

The Elf escapes from a Ravenbee

Close-up of a Crystal Ball

The Adventurer collects a Treasure Chest

Ravenskull Castle — The Fortress of Doom

Your task is to save the village of Austburg from imminent devastation. You must enter Ravenskull Castle and retrieve the silver crucifix which the evil Baron Strieg has stolen. Only then will Austburg be safe from the Zombies who inhabit the swamp surrounding the medieval castle.

Ravenskull is a massive arcade-adventure featuring smooth 4-way screen scrolling over the 4 levels of play. Each level is 64 times the size of the screen, and there is an initially-bewildering variety of game characters including: acid pools, man-eating plants, time-doors, keys, pick-axes, scythes, spades, bows and arrows, dynamite, bells, food and wine (beware! it may be poisonous or have strange side-effects). There are also several magical scrolls and potions to be found. These may be good or evil; for example the strength scroll gives you the power to push wooden casks, whereas the lightning-strike scroll is fatal if used.

The guardians of the castle, the vicious Ravenbees have to be avoided or, in some cases, destroyed — but there is only one way to kill them; you must discover how as you venture through the dank passages of the castle. Your quest is not an easy one — only with time, experience and a little luck will you unravel all the mysteries within Ravenskull Castle.

PRIZE COMPETITION

If you are skilful enough to complete Ravenskull, you can enter our prize competition. The prizes include a £100 first-prize, with Superior Software T-shirts for runners-up.

PRICES

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BBC Micro cassette	£9.95		

Ravenskull is compatible with the BBC B, B+, Master

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The screen pictures above show the BBC Micro version of Ravenskull.

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From Page 115

to purchase one of the lesser known micros as this could cause maintenance problems later on.

- Data transfer: Since transferring large amounts of data requires a serial port, a micro such as the Master – that comes with this as standard – has a decided edge over one like the Compact.

Even if you don't want to pass data to other micros along a wire you would still be wise to ensure that disc formats are compatible with any other micro with which data might be exchanged.

- Documentation: Good documentation of both hardware and software is important. Look for indexes, clear chapter headings and summaries, lots of examples and most especially an easy-to-read style.

Now that we've assessed most of the system's hardware we can turn to the software. If you have to opt for one of two computers with little to choose between them the final selection can rest on the best software available.

- Database: Often the most useful of all software packages. It can be used as a simple filing system, and with sufficient planning a sophisticated example can be used virtually as a system generator.

Good databases make input easy and are also capable of complex arithmetic, sophisticated data handling such as searching and sorting plus flexible output styles. No system should be without a good database, irrespective of the application area.

- Spreadsheet: If you don't like spending hours writing programs which are only run for a few minutes each month, using a spreadsheet can be a real boon.

Once you are familiar with its facilities you can perform complex calculations and analyses within minutes. As with the database, the spreadsheets's versatility means that no minimal system should be without one.

- Accounts: There are many accounting packages available and the key point to remember is that even if one comes from a major supplier that does not necessarily guarantee its excellence, let alone suitability.

The secret is to find the product that does the job, the whole job and nothing but the job. The minimal system accounting package should handle VAT, 30-50 nominal headings, sales and purchase ledgers, but is unlikely to include payroll.

- Word processor: Some require many hours of familiarisation. Others, which are delightfully easy to use at the outset, rapidly become sources of frustration through lack of facilities.

If all you need is the occasional simple letter then an elementary one is sufficient. But if your work involves producing complex and lengthy manuscripts or reports, a program with a large variety of fonts and layouts is essential.

- Appearance: The look and design of the micro system is a subjective assessment, so it might seem like a curious criterion, but it should not be overlooked.

This category includes the characteristics of the screen and keyboard, since operators do not appreciate having to look at flickering screens or working with stiff, badly angled keyboards.

Manufacturer ....
Model ....

Criteria	Score	Familiarity (3)	Total
Operating system (20)			
Languages available (15)			
Disc drives (15)			
Memory (12)			
Growth potential (10)			
Data transfer (10)			
Documentation (9)			
Database (8)			
Spreadsheet (6)			
Accounts (5)			
Word processor (4)			
Appearance (3)			
Printer (8)			
Total			

Figure 1

A tidy system is essential. Often a reasonable solution is to get suitable plinths behind which you can hide most of the cables, particularly if you intend working from home. Having an attractive, quiet, compact installation is less likely to produce family tensions.

- Printer: It may come as a surprise to find that the printer – essential for business applications – is the last item in this list. Simply, there are so many available that by now any system which cannot connect with the vast majority of them should long since have been weeded out.

Given the choice between print quality and print speed, insist on quality. In a minimal system, the quality offered by an additional five minutes spent printing more than compensates for untidy output.

In conclusion I must stress again that these guide-lines aim to provide you with general principles rather than suggesting particular products. Nevertheless several things should now be obvious – chiefly that there is no system which meets all the criteria perfectly.

Provided that you are familiar with the BBC Micro, the extra points this gains it in the assessment chart should gain it a high enough score to warrant serious consideration. ■

A welcome in the hillside – thanks to the BBC Micro

THE Welsh Tourist Board has been getting a lot of publicity out of the BBC for the last three years, but it's not as a result of constant visits to the principality by Cliff Michelmore and his Holiday team. It's just that they now have no less than 18 BBC Micros dotted about their various offices in Great Britain giving public access to information about events, guest houses and so on.

An ingenious use of a door entryphone system outside each office allows people to choose options from a series of menu-driven programs on BBC Micros. The machines can then remain in operation 24 hours a day.

The idea for the system came from America, and was designed by John Wardley, a freelance tourism and leisure consultant. "I got the idea", he says, "after seeing a similar thing when I went to Walt Disney World in Florida.

"I happened to be with officials from the Welsh Tourist Board at the time, and I suggested to them that they ought to think about doing something similar. They said they were keen, if I thought I could make it work. I felt sure that there was no reason why you couldn't design such a system, so that's how it came about".

One of John Wardley's main business interests has been in the designing of theme parks and the use of animated models. He does work for Madame Tussauds, and was responsible for designing their exhibition at Windsor showing a visit to the town by Queen Victoria and the giving of a talk by an animated Charles Dickens, complete with a dog at his feet that usually managed to steal the show.

"That exhibition is fairly crude", John reckons, "compared to what can be done now with animation and models, but I was doing all this without really knowing anything about computers at all, and of course it's all computer-controlled. I decided to get in and learn when the BBC Micro came along.

"I joined the BBC's Computer Literacy Program, and although I'd never touched a computer I placed an order at once. Then there was a lengthy delay in delivering the machine, and I completed a course in computing at the National Extension College still without having touched a computer. But when one did arrive nine months later it was a total revelation to me, I was fascinated by the BBC Micro".

It was natural, then, for John to start work on the program for the Welsh Tourist Board using the BBC Micro, as he was by this time starting to get familiar with the machine and had already done some programming on it. But in designing a viewdata style program he also needed to mix text with the teletext graphics, and the BBC Micro thankfully proved to be a cost-effective machine from the Tourist Board's point of view.

"I don't provide the hardware as well", John explains, "they go to a computer consultancy firm for that, but I write and design the software and customise the systems for them. All the data is contained on a separate disc, and I've also provided them with a suite of utility programs which enables someone else to update the data files fairly easily. It was part of my idea that it should be possible to do that, so the person who has the system is not totally dependent on coming back to you the whole time.

By MIKE GERRARD

"I use a high quality German door entryphone system, which is connected to the computer in the shop window, and anyone outside can select the options they want from the menus by pressing the appropriate number on the entryphone. It's reasonably vandal-proof, though they do occasionally cause trouble, unfortunately.

"Whenever the Tourist Board want a new system for one of their offices I make them up a keypad and it's then fairly easy to install, and I also give them a customised software disc which relates to the particular branch where the system's going to be. They tried the first one in their main office in Cardiff, and that proved successful so from there it's just expanded".

What of the Welsh Tourist Board themselves? How do they feel about the system, which is called Info-Point? "The machines have proved very popular in terms of the frequency with which they are used", said Eirlys Thomas, a promotions officer with the Board in Cardiff, who also helps coordinate the use of their Info-Point service.

"The program incorporates a key number so that we can see how many times people look at the information and which parts of it they look at, and that helps you to decide what to put in there. Of course it's very difficult to say how effective it is in terms of, say, whether anyone books at a guest house simply because they saw it on the computer screen, but we are currently looking at ways of extending this to try to make it possible".

Eirlys stresses that Info-Point is very much a marketing tool, enabling information to be accessible even when their offices are closed, but it can also save people from waiting in queues for simple information at times when the office might be busy, such as at the height of the summer.

"Info-Point gives information about accommodation, events, resorts – general information of the type that doesn't change on a day-to-day basis. The programs are up-dated every six months. We organise that from here and each branch will receive its new data disc from us".

Eirlys also points out that many of the machines have been running permanently – all day, every day – for up to two years, with scarcely any technical problems at all, and that's certainly a testimony to the BBC Micro's stamina.

"From the original single machine and drive we've expanded so that we now have 18 in use in our various offices, mostly in Wales, although we did have one in our London office that was running there in a window on Piccadilly for two years. It was only recently removed because the space was needed for turning the area into a craft centre. We have the machines in places like Chester, Cardiff, Brecon and Newtown, and we also have another program that we use for promotional activities here in Cardiff".

The BBC Micro was chosen because it was the most cost effective at the time for a complete system with disc drive and monitor, and Eirlys says that everyone has been very happy with them. The initial testing period has long passed, and the machine will still be in use for the foreseeable future.

But if the Info-Point system has proved successful, why have more companies not taken it up? "Well", says John Wardley, "this is all more of a sideline for me, really. I haven't exploited it to its full as I haven't had the time.

"I've been approached by any number of people to provide them with a similar system, companies like the National Bus Company and the English Tourist Office, but I've had to turn them away as I don't have time to deal with it all. In fact if anyone came to me with a reasonable offer to buy the system outright then I'd be interested in selling it.

"My main business is still designing theme parks and using animation. I'm currently involved in setting up the new exhibition at the London Pavilion near Piccadilly. It will be a few years before it opens, but it'll be stunning when it's ready. It's a history of rock music with the latest in animated models, three auditoriums and revolving stages. That is my main line of business, not developing BBC Micro software.

"I still use my own machine all the time, it's got so many add-ons now that it's quite amazing. I run my business on it completely, doing all my accounting and word processing. In fact I can honestly say that without it I'd be absolutely lost".

The sophisticated way of getting just what you see

JIM NOTMAN finds Inter-Word a giant step forward in word processing

EVERY year I see dozens of software packages, good, bad and indifferent. It is always a pleasure to review a great piece of software like Inter-Word which manages to stand head and shoulders above the crowd.

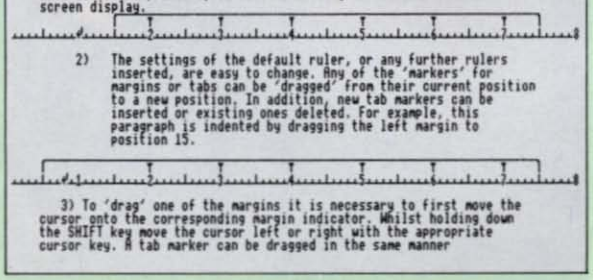
Computer Concepts made its name with Wordwise, a very simple word processor, which was admirably suited to users new to computing and was one of the earliest roms to be offered for the BBC Micro. It proved to be the right piece of software at the right time but since then the market has changed. The BBC Micro has matured along with its users who now demand much more sophisticated software.

This progression in facilities and complexity is reflected in the length of the software. The original Wordwise was only 8k in length while the more professional looking View from Acornsoft has about 12k of code. This package from Computer Concepts has 32k!

It consists of a 32k eprom mounted on a tiny printed circuit board which plugs into a paged rom socket. One of the pins has been deliberately removed which is a little disconcerting unless you read the instructions first.

Also on the circuit board is a PAL (programmed array logic) chip which controls switching between different parts of the eprom so that the BBC Micro is fooled into thinking that the software is only 16k long.

This has two main advantages. Firstly the software only occupies one rom socket and secondly it makes it much more difficult for software pirates to copy it. The principal disadvantage is that it is not Tube compatible and it is highly unlikely that a Tube version will ever be written.



```
1) The default ruler automatically inserted at the top of a new
document has left and right margins of five characters each, leaving
seventy characters for text. This is so that it fits on most commonly
used 80-column printers, as well as suiting the default 80-column
screen display.

      2)   The settings of the default ruler, or any further rulers
           inserted, are easy to change. Any of the 'markers' for
           margins or tabs can be 'dragged' from their current position
           to a new position. In addition, new tab markers can be
           inserted or existing ones deleted. For example, this
           paragraph is indented by dragging the left margin to
           position 15.

   3) To 'drag' one of the margins it is necessary to first move the
cursor onto the corresponding margin indicator. Whilst holding down
the SHIFT key move the cursor left or right with the appropriate
cursor key. A tab marker can be dragged in the same manner
```

Figure I: Left and right margins are controlled by rulers

It is compatible with the BBC Model B, B+ and the Master. With the Master the extra height of the eprom and circuit board means that there is not enough room in socket 5, though there is no problem with sockets 7 or 8.

You enter the software by typing *IWORD and this displays the main menu which will look familiar to any Wordwise user. However, when you enter the editing mode by pressing Escape, any similarity to Wordwise vanishes.

The screen switches to an 80 column mode to permit Inter-Word's "what you see is what you get" format, where the text is displayed on the screen in the same layout as it will appear when printed.

Bold printing and underlining are also displayed on screen and as with other word processors of this type, the tab settings and left and right margins are controlled by rulers. You see these displayed in Figure I.

The screen can be considered as a window on to the text area. This means that if a printed row (maximum of 120 characters) is wider than the screen display you can move the window around to see all the text. This is done using the cursor keys just as you would scroll up and down in Wordwise.

Also in similar vein to Wordwise a number of commands are controlled by the function keys. These are listed in Table I and a keystrip detailing them is provided in the package. Further commands can be entered using Control in combination with another key as indicated in Table II.

One feature becoming increasingly common on all micros, is the drop-down menu – a temporary menu which is removed when no longer required. For example pressing f0 displays your current status and a menu from which other sub-menus can be selected. Figure II shows you the idea.

Selections may be made from the menus in different ways. Beginners can either press a numeric or function key corresponding to the option, or position a highlight bar over the option with the cursor keys and press Return. When you get to know the software better a sub-menu may be selected by pressing Control in combination with the appropriate function key.

The great advantage of a system like this is that it is very friendly and easy to use. You don't have to remember numerous commands or their syntax. All you need is an idea of which menu to look at.

We can investigate Inter-Word's main features by looking at its sub-menus.

Preferences: Within all the sub-menus options and their changing values are selected using the cursor keys. For example if you choose the Columns on screen option using the up and down cursor keys, the values 40, 53, 80 and 106 are presented in sequence as you press the left and right keys.

A good quality monitor is highly desirable for 80 column work but is a necessity for the extra 106 column mode that Computer Concepts has managed to program.

These screen modes also use up a considerable amount of memory. This is no problem if you have a Model B+ or a Master, but with a standard model B you really need a shadow screen ram board, which will add another £70 to £90 to the cost of the package.

The option highlighted will number each line, aiding the accurate layout of a page.

If you find the characters tend to wobble on your screen, the last option in the menu will toggle the interface off, making the screen much steadier.

Marked section: Just like Wordwise, markers can be placed anywhere in your text by pressing f3. There is also an option to mark all the text. All the usual functions like move, copy and delete a block of text are supported, but there is also the ability to change character fonts and format the text.

Search and Replace: Using this option is simple and straightforward. The search string may include a # to indicate a wildcard – a character to stand in place of any other. If the Confirm changes option is on you will be asked "Replace ? (Y/N)" after each word is found. Because searches treat upper and lower case letters differently the Case sensitivity option specifies whether the case should be ignored or not.

Page layout: For simple editing the paging option can be switched off to display the continuous text. When the option is on, the page breaks are displayed along with any headings and footings defined. The display of page breaks is especially valuable when editing to show "orphan" words, single words at the end of paragraphs which overflow from one page on to the next. The other options set up basic page details.

Printer setup: The first option in this menu is a simple function which all word processors should

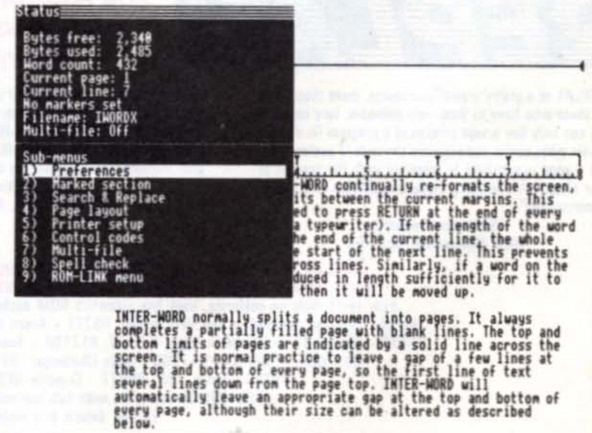
→

	Function key	Shift+function key
f0	status menu	
f1	embedded command menu	
f2	insert ruler	
f3	insert marker	
f4	align left	underline
f5	centre text	bold
f6	align right	dotted
f7	justify	normal
f8	delete marked	
f9	copy marked	

Table I: Function key commands

A	delete character under cursor
D	delete word at cursor
F	find next occurrence of search word
G	start immediate search
L	delete whole of line
N	move cursor to the same relative position on the next page
P	move cursor to the same relative position on the previous page
R	remove all markers
S	swap case of character under cursor
X	mark entire text
Z	mark the word at the cursor position
^	move cursor to the current ruler

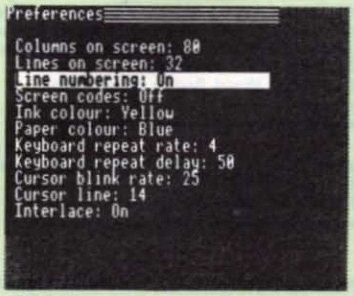
Table II: Control key commands



```
Status

Bytes free:  2,340
Bytes used:  2,485
Word count:  432
Current page: 1
Current line: 7
No markers set
Filename: IWORDX
Multi-file: Off

Sub-menus
1)  Preferences
2)  Marked section
3)  Search & Replace
4)  Page layout
5)  Printer setup
6)  Control codes
7)  Multi-file
8)  Spell check
9)  ROM-LINK menu
```

```
-WORD continually re-formats the screen,
its between the current margins. This
ed to press RETURN at the end of every
a typewriter). If the length of the word
he end of the current line, the whole
e start of the next line. This prevents
ross lines. Similarly, if a word on the
duced in length sufficiently for it to
 then it will be moved up.

INTER-WORD normally splits a document into pages. It always
completes a partially filled page with blank lines. The top and
bottom limits of pages are indicated by a solid line across the
screen. It is normal practice to leave a gap of a few lines at
the top and bottom of every page, so the first line of text
several lines down from the page top. INTER-WORD will
automatically leave an appropriate gap at the top and bottom of
every page, although their size can be altered as described
below.
```

Figure II: The Status menu



```
Preferences

Columns on screen: 80
Lines on screen: 32
Line numbering: On
Screen codes: Off
Ink colour: Yellow
Paper colour: Blue
Keyboard repeat rate: 4
Keyboard repeat delay: 50
Cursor blink rate: 25
Cursor line: 14
Interlace: On
```

The Preferences menu

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The Acclaimed Utility for Tape to Disc Transfer

Vine Micros

"REPLAY is a pretty marvellous device, more than a toy for those who have to document software, very useful if you can only buy a tape version of a program (it doesn't matter what nooks and crannies the code is packed into) and a good opportunity to have fun with the screens of your choice. A liberating piece of software and highly recommended".

'Software Reviews',
A&B Computing, Dec. '85

"REPLAY is the current state-of-the-art answer to tape to disc transfer, available for the BBC B (and B+). This consists of a ROM and some hardware which must be attached inside the computer. Once installed it will cope with virtually any program you care to put to the test".

'First Byte',
ACORN USER, May, '86.

"Many facilities are advertised to enable BBC micro users to copy or back-up protected programs and transfer them from tape to disc. While some break the protection in the process and thus assist software piracy, others are more responsible, using techniques which retain the protection. Vine Micros, who already leads the field in the latter group with the T.D.ROM, now supplies REPLAY".

'ROM Roundup',
MICRO USER, July, '86.

TAPE TO DISC TRANSFER – MID-PLAY 'STOP AND SAVE' - MID-GAME PAUSE FACILITY
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REPLAY must be matched to the DFS in use: R8271 - Acorn 8271, Pace and Watford S/D: R8272 - U.D.M. DFS:
R1770 - Opus 3.45 and Solidisk Issue 1 board: R1770A - Acorn 1770 DFS and ADFS, also Solidisk Issue 2 board:
R1770B+ - BBC B+: R1770C - Opus Challenger: R1770W - Watford DDFS: R2791 Opus 3.15:
R2793 - Opus 3.35: R8877 - Cumana QFS: (Acorn 'Master' in preparation).
Price **£35.00** inclusive, with full instructions for installation and use.
Further details and reviews available.

The MATRIX ROM
BBC 'B', B+ and ELECTRON

This ROM will be of interest to Engineers, Scientists and Mathematicians. Using BASIC commands it is an indispensable tool for performing matrix operations and the solving of linear simultaneous equations. The MATRIX ROM was written with the co-operation of the Civil Engineering Dept., University of Southampton.
Price: **£36.00** (plus VAT) includes Manual. Quantity discount offered.
Further details can be provided on request.

"B+ to B" CONVERSION KIT

This addition will enable BBC 'B' tapes to be used on the B+ computer. (requires 1.20 O.S. ROM) Price: £21.95 with O.S. 1.20 ROM.
£15.95 without ROM (both prices include VAT & Post).

The ADDCOMM ROM
BBC 'B', B+ and ELECTRON.

A Toolkit/Graphics utility adding 40 extra BASIC commands. Brilliant programming and value for money. 16-page brochure and reviews sent on request. Price: **£28.00** inclusive.

Ready now

ACORN MASTER PRODUCTS
O.S. Overlay ROM Board

An internal board taking three ROMs which can 'overlay' any of the eight ROMs already built-in.

(Computer must have a socketed 1Mbit ROM.)
Price: **£19.95** (inclusive of VAT and Post.)

WRITE-PROTECT SWITCH
Acorn 'Master'.

A small module which plugs into the computer and offers write-protection to the sideways RAM banks. Price: **£8.95** inclusive of VAT and Post).

VINE MICROS, MARSHBOROUGH, SANDWICH,
KENT CT13 0PG. (Tel: 0304 812276)
Or through your local Dealer.

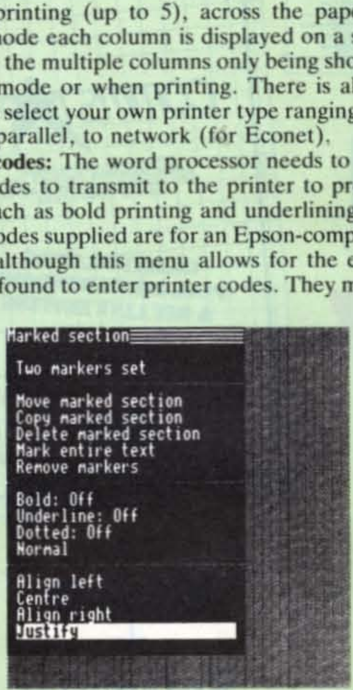
BARCLAYCARD
VISA

From Page 121

have – the ability to print any number of copies of the text. You don't need to print all the pages, just those you require. There is a limitation in page numbering, up to a maximum of 255, which is a problem if you are planning to write an epic!

This section reveals one of Inter-Word's most innovative functions – the ability to allow multiple column printing (up to 5), across the paper. In editing mode each column is displayed on a separate page, the multiple columns only being shown in preview mode or when printing. There is also an option to select your own printer type ranging from serial or parallel, to network (for Econet).

Control codes: The word processor needs to know which codes to transmit to the printer to produce effects such as bold printing and underlining. The default codes supplied are for an Epson-compatible printer, although this menu allows for the easiest way I've found to enter printer codes. They may be input as decimal or hexadecimal numbers, Ascii characters, or even as Ascii control mnemonics. For example the escape character may be entered as 27, &1B or ESC. When new codes are defined they may easily be saved and loaded.



```
Marked section
 Two markers set

 Move marked section
 Copy marked section
 Delete marked section
 Mark entire text
 Remove markers

 Bold: Off
 Underline: Off
 Dotted: Off
 Normal

 Align left
 Centre
 Align right
 Justify
```

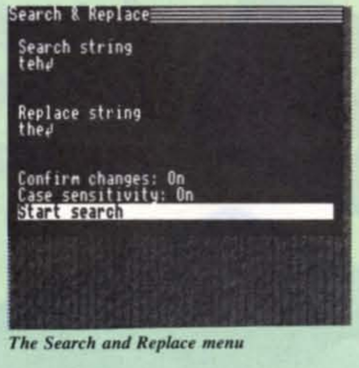
Figure IV: The Marked section menu

Multi-file: A major limitation with any small computer like the BBC Micro is its lack of memory. You just can't load all the text for long documents such as a book, into memory at the same time.

The multi-file facility allows you to split a long document into a number of shorter ones, each of which will comfortably fit into memory, but still move backwards and forwards throughout the whole document. Inter-Word keeps a list of all the files that belong to a document and allows you to insert new parts and delete those no longer required.

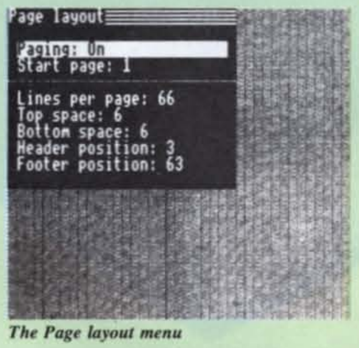
Spell check: A software interface is provided for a spell checker currently being developed but not yet available. The specifications sound interesting with the facility to check each word as it is typed in with

→



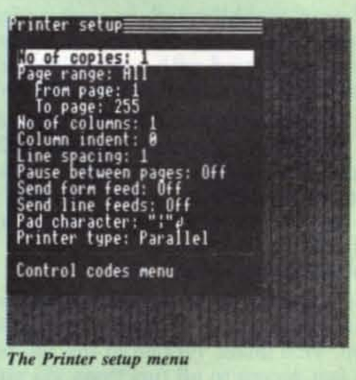
```
Search & Replace
 Search string
 teh↵


 Replace string
 the↵


 Confirm changes: On
 Case sensitivity: On
 Start search
```

The Search and Replace menu



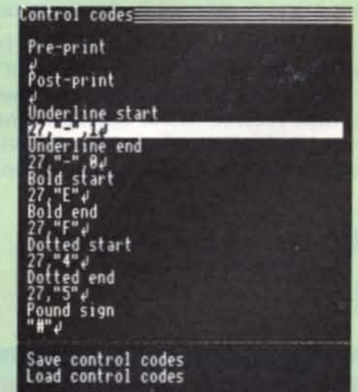
```
Page layout
 Paging: On
 Start page: 1

 Lines per page: 66
 Top space: 6
 Bottom space: 6
 Header position: 3
 Footer position: 63
```

The Page layout menu



```
Printer setup
 No of copies: 1
 Page range: All
   From page: 1
   To page: 255
 No of columns: 1
 Column indent: 0
 Line spacing: 1
 Pause between pages: Off
 Send form feed: Off
 Send line feeds: Off
 Pad character: ";"↵
 Printer type: Parallel

 Control codes menu
```

The Printer setup menu

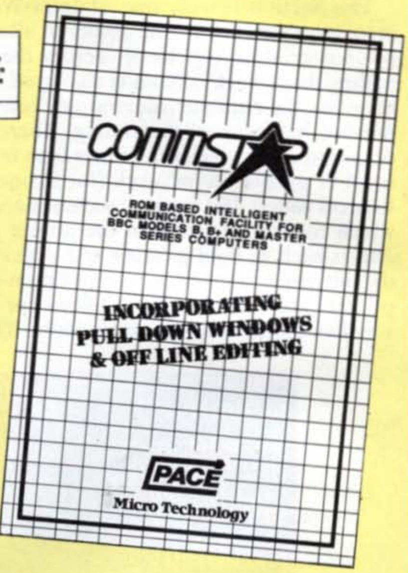


```
Control codes
 Pre-print
 ↵
 Post-print
 ↵
 Underline start
 27,"-",1↵
 Underline end
 27,"-",0↵
 Bold start
 27,"E"↵
 Bold end
 27,"F"↵
 Dotted start
 27,"4"↵
 Dotted end
 27,"5"↵
 Pound sign
 "#"↵

 Save control codes
 Load control codes
```

The Control codes menu

A *complete* communications package for the BBC Micro for under £100!

We've broken the price barrier!
APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
NIGHTINGALE by Pace
Viewdata
300 Baud
CCITT (Euro)
Bell (USA)


COMMSTAR II
ROM BASED INTELLIGENT COMMUNICATION FACILITY FOR BBC MODELS B, B+ AND MASTER SERIES COMPUTERS
INCORPORATING PULL DOWN WINDOWS & OFF LINE EDITING
PACE
Micro Technology

The long-awaited price breakthrough in communicating with the BBC Micro is here now – thanks to a special deal *The Micro User* has negotiated with one of Britain's leading modem manufacturers, Pace Micro Technology.

We can offer a dramatic reduction in the price of one of the most reliable modems ever made, together with its associated software. The modem is the BBC-compatible Pace Nightingale, which operates at the two most popular speeds – 1200/75 (for Prestel and other viewdata systems) – 300/300 (for MicroLink, Telecom Gold, remote mainframes, commercial databases, etc).

The software we are offering is the renowned Commstar II, one of the most sophisticated packages ever produced for the BBC Micro. This latest version of the top-selling package features fast access to all functions via pull-down menus and windows – and is extremely simple to use.

● Readers taking advantage of this offer will also be entitled to free membership of MicroLink, Britain's fastest-growing electronic mail service. With it you can use your BBC Micro to send (and receive) telex, telemessages, down load free telesoftware, and communicate directly with other users all over the USA and other parts of the world.

MicroLink
In association with
TELECOM GOLD

Free registration to MicroLink (worth £5) with every order.

Modem
+
Software
£99.85
(RRP £147.85)
SAVE £48

Comstar II
£29 (RRP £34)
SAVE £5

Prices do not include postage

TO ORDER TURN TO THE FORM ON PAGE 167

From Page 123

a large vocabulary on rom.

Rom-Link menu: This displays the same information as Intersheets's :INFO – the Rom-Link files currently in memory – but in a more attractive way. This is necessary to keep track of them because Inter-Word may have up to 16 documents in memory at the same time.

Embedded commands: It may be necessary to send commands to the printer, issue Rom-Link commands or even operating system commands from the text. So as not to disturb the appearance of the text these are embedded within it and all that is seen on the screen is a reversed character.

In the example the control codes to switch an Epson printer to superscript have been inserted. The lower part of this menu deals with defining up to 60 headings and footings that you can have displayed on each page.

When the load and save options are selected from the main menu the files in the current disc directory are displayed. To select a file you simply position the highlight over the required name as shown.

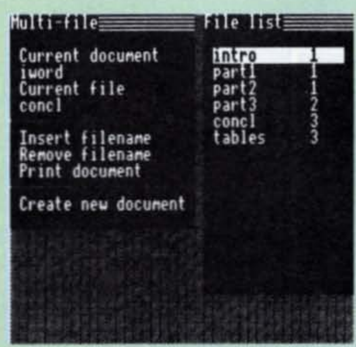
Just as in Wordwise-Plus there is a check to ensure that a file is not inadvertently overwritten with one of the same name. With the ADFS, directories are also displayed and may be selected to show their contents. Wordwise files need to be stripped of all their embedded commands before being loaded into Inter-Word but this is easily handled with a short utility listed in an addendum sheet.

Like the other Rom-Link products in the series, Inter-Sheet and Inter-Chart, colon commands may be used to transfer text or data between the different packages.

For any serious computing you need a spreadsheet and database as well as a word processor. However, you need to be sure that the various pieces of software are compatibile with each other. I need to use a database and often import data from one into the word processor. Good as Inter-Word is, I will not fully convert to it until the database in the Rom-Link system – Inter-Base – is available.

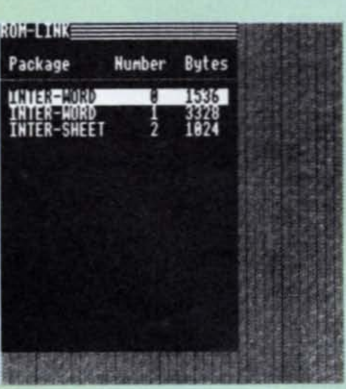
Computer Concepts has certainly enhanced its reputation for innovative software with this product. For all its extra sophistication and complexity the drop-down menus make Inter-Word very easy to use, both for the beginner and the more experienced alike. ■

Product: Inter-Word
Price: £56.35 or £45.08 for registered Wordwise-Plus owners.
Supplier: Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX
Tel: 0442 63933



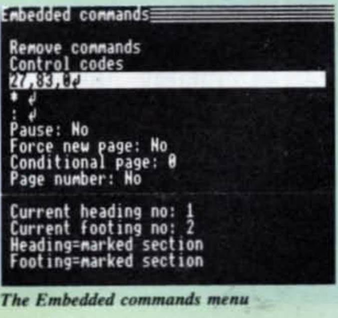
```
Multi-file                      File list

 Current document               intro       1
 iword                          part1       1
 Current file                   part2       1
 concl                          part3       2
                                concl       3
 Insert filename                tables      3
 Remove filename
 Print document

 Create new document
```

The Multi-file menu



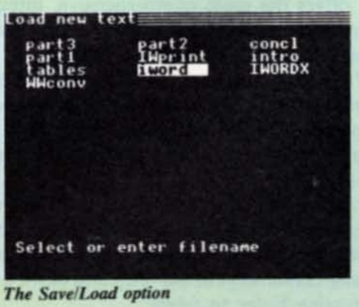
```
ROM-LINK

 Package        Number  Bytes

 INTER-WORD          0   1536
 INTER-WORD          1   3328
 INTER-SHEET         2   1024
```

The Rom-Link menu



```
Embedded commands

 Remove commands
 Control codes
 27,83,0↲
 * ↲
 : ↲
 Pause: No
 Force new page: No
 Conditional page: 0
 Page number: No

 Current heading no: 1
 Current footing no: 2
 Heading=marked section
 Footing=marked section
```

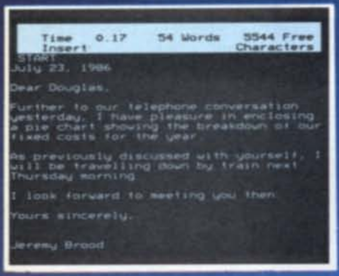
The Embedded commands menu



```
Load new text

  part3         part2         concl
  part1         IWprint       intro
  tables        iword         IWORDX
  WWconv




 Select or enter filename
```

The Save/Load option

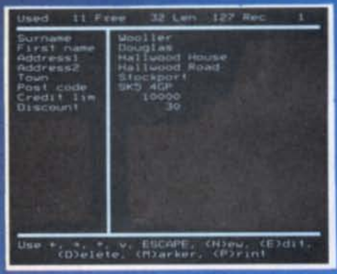
All this in just



```
  Time   0.17   54 Words   5544 Free
  Insert                   Characters
 START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year.

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning.

I look forward to meeting you then.

Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR

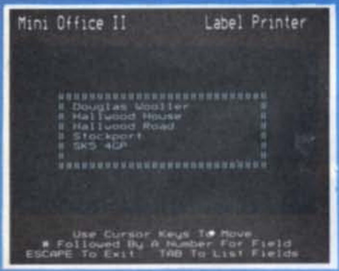
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



```
Used   11 Free   32 Len  127 Rec    1
Surname       Wooller
First name    Douglas
Address1      Hallwood House
Address2      Hallwood Road
Town          Stockport
Post code     SK5 4GP
Credit lim       10000
Discount            30

Use ←, →, ↑, v, ESCAPE, (N)ew, (E)dit,
      (D)elete, (M)arker, (P)rint
```

DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II            Label Printer



     ##############################
     # Douglas Wooller            #
     # Hallwood House             #
     # Hallwood Road              #
     # Stockport                  #
     # SK5 4GP                    #
     #                            #
     ##############################



       Use Cursor Keys To Move
    # Followed By A Number For Field
 ESCAPE To Exit    TAB To List Fields
```

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

70
60
50
40
30
20
10
0
J F M A M J J A S
PRODUCTION COSTS
CUB
DATABASE SOFTWARE
Mini Office II
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose
then press RETURN
(c) Database Software 1986

...and at a price

Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

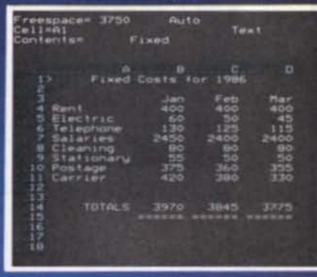
It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

ONE package!

SPREADSHEET

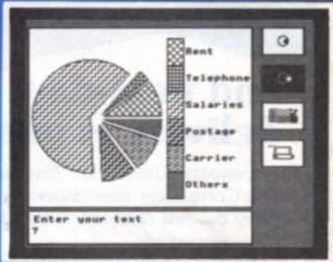
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



```
Freespace= 3750     Auto
Cell=A1                     Text
Contents=       Fixed

            A        B        C        D
  1>        Fixed Costs for 1986
  2
  3                Jan      Feb      Mar
  4 Rent           400      400      400
  5 Electric        60       50       45
  6 Telephone      130      125      115
  7 Salaries      2450     2400     2400
  8 Cleaning        80       80       80
  9 Stationary      55       50       50
 10 Postage        375      360      355
 11 Carrier        420      380      330
 12
 13
 14      TOTALS   3970     3845     3775
 15             ====== ====== ======
 16
 17
 18
```

GRAPHICS

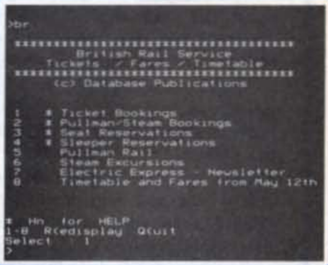
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



```
Enter your text
?
```

COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

 **************************************
        British Rail Service
    Tickets  / Fares / Timetable
 **************************************
      (c) Database Publications


 1    * Ticket Bookings
 2    * Pullman/Steam Bookings
 3    * Seat Reservations
 4    * Sleeper Reservations
        Pullman Rail
 6      Steam Excursions
 7      Electric Express - Newsletter
 8      Timetable and Fares from May 12th


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select    1
>
```

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

BBC Model B and B+

Cassette	*£14.95*
5¼" disc	*£16.95*
3" disc	*£19.95*

The original Mini Office has been recognised as an astonishing bargain for anyone looking for a low-cost introduction to serious software. Now the four programs which made it up have been substantially enhanced and two new programs have been added. The result, Mini Office II, is more than just an introduction to serious software applications. It's good enough to fulfill the entire software needs of many a small business! . . . The range of features in each program is astonishing for a package of this cost . . . The spreadsheet is every bit as good as a program such as MasterCalc which costs more than the entire Mini Office II . . . This delightful little program [Graphics] allows you to produce professional looking charts to illustrate a set of figures. – **Amstrad Action**

The word processor is literally overflowing with excellent features . . . The database is very easy to use yet extremely powerful . . . The spreadsheet program is the next little gem . . . Having used Mini Office II for the past few days I cannot praise it too highly. – **Popular Computing Weekly**

DATABASE SOFTWARE

Order form on Page 167

Use your micro to speed up your mail . .

Telemessage
1 POSTAGE PAID GREAT BRITAIN PHO 413

JOIN NOW!

Can't wait? Then phone 061-456 4157 for your ID number and personal password – and start using MicroLink today!

and next-day delivery is guaranteed!

Everyone knows that "first class" mail is far from perfect. The Consumers' Association reported in June that two out of every five first class letters fail to be delivered the day after they are posted.

So if you have an urgent letter that just HAS to be delivered tomorrow, what do you do?

If you have a home or business computer the answer is at your fingertips.

You compose the letter on your computer. Then, in a simple operation that takes only a few seconds, you send it down the telephone line to MicroLink, the electronic mail service operated in association with Telecom Gold.

That's the end of your part in the story. From now on electronics take over. Your letter is fed automatically into the national British Telecom Telemessage service. It's switched to the delivery office nearest the recipient's address, where it's printed out on a letter-quality printer and put into a distinctive yellow envelope. And providing it was sent any time up to 8pm, it is delivered by the local postman by breakfast time the next day. Exactly as you'd typed it out the day before.

And how much does this ultra-fast service cost? From just £1.25 to send a letter of up to 350 words to any address in the UK (and an extra £1.70 to any address in the USA). You can also have it accompanied by a colourful greetings card (choose from 16 different varieties) for another 65p.

Telemessages is just one of many services offered by MicroLink that are designed to speed up communications. Find out more by returning the coupon below.

Please send me more information about your speedy Telemessage service and other aspects of MicroLink.

Name

Address

MicroLink
in association with
TELECOM GOLD

Send to: MicroLink,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

MU1

---

contex computing

BANK MANAGER (for disc systems only)
The most advanced and versatile personal bank account management program available for all BBC computers. Consistently acclaimed!

"data entry is a delight . . . professional . . . excellent product" **Micro User April 86**

Enter cheques and receipts. Standing orders any frequency. Automatic date sequencing. Reconcile statements. Search, amend and delete. Unreconcile. Move forwards or backwards. Analyse expenditure. Forward cash flow forecast. Up to 36 simultaneous 'bank' (bank, credit cards, savings, cash) accounts online simultaneously, inter-account transfers, 9999 standing orders, 99 analysis categories, 12 actual and 12 budgets per category, over 4,000 postings on an 80tk disc. Reports to screen or printer. Graphics. Foreign currency support. Password. File recovery. Auto exec. file. Field editing. Itemised look ahead. Programmable report writer.

Standard Bank Manager for the BBC B, B+ £17.50

BANK MANAGER MASTER (for disc systems only)
Version 2 now available. Includes all of the facilities of the standard Bank Manager plus ADFS file system support, shadow screens, uses sideways RAM, 40 or 80 column screen reports, improved graphics, m/c windows, function key support and onscreen labels, additional functions added to the already extensive report facilities.

Bank Manager Master for the MASTER and MASTER COMPACT £22.50
Upgrade from standard, return original disc and £6.00

BANK MANAGER BUSINESS UTILITIES (for disc systems only)
For the 'professional' who also uses the BANK MANAGER to control the business accounts the BUSINESS UTILITIES add double entry trial balance and programmable spreadsheet analysis reports. Generated from cheque and cash transactions keyed into BANK MANAGER. Just pass the reports to your accountant! Use with either standard or master/compact version.

Bank Manager Business Utility Pack 1 £12.00

TYPING TUTOR
Quickly learn to touch type. Over 90 smoothly graded lessons graduate you from the basic home keys to complete keyboard mastery. Unique word scan line checking. Target WPM and percentage correct. You may revise the targets or lessons as required. Audio key click for positive key depression. Establish a typing rhythm using the automatic metronome. Free format option. Recommended.

for BBC B, B+, Master and Compact; Cassette £9.50, Disc £12.50

ALL PRICES FULLY INCLUSIVE. FREE POSTAGE WITHIN UK. Enquiries and Access credit card orders telephone 023 03 347

CONTEX COMPUTING, 15 Woodlands Close,
Cople, Bedford MK44 3UE

Access

Please rush me .... for BBC: ☐ B ☐ B+ ☐ Master ☐ Compact
☐ Cass ☐ 5.25" ☐ 3.5" ☐ 40tk ☐ 80tk ☐ DFS ☐ ADFS
Enclosed £ or debit my Access card no. ....
Name ....
Address ....
....

MU

FAST DELIVERY

MASS DATA STORAGE - The Complete Solution

With more experience than any other company in the provision of hard disc storage for BBC users, Amcom can supply a range of ADFS compatible winchester drives, second to none.

With storage capacities of up to 600 megabytes, Amcom winchesters are designed for use in demanding environments like schools, colleges, and universities as well as for industrial applications.

Connection of an Amcom winchester couldn't be simpler as it connects directly to the 1MHz bus socket of the computer by a 34-way cable. Plug in, switch on, and that's all there is to it.

Used in conjunction with or to replace conventional floppy disc drives, Amcom hard disc systems are totally compatible with all ADFS software as well as the BBC Master Series computers.

Amcom for the complete mass storage solution

Amcom

For further information on: Winchester hard discs, Educational networking systems or Tapestreamers, contact:

Amcom Software Ltd. 35 Carters Lane,
Kiln Farm, Milton Keynes MK11 3HL.
Telephone (0908) 569212

Getting to the point in a spreadsheet

In Part 9 of his series on spreadsheets NIGEL PETERS concludes his look at Mini Office II with an examination of its decimal spacing system.

THIS month I'll finish looking at the use of the function keys in Mini Office II, bearing in mind that all spreadsheets will have similar features. Next time we'll break new ground and start looking at other spreadsheets and their features.

But for the moment back to Mini Office II. No doubt by now you'll have become accustomed to the way that when you enter a number, say 123, into a cell, it becomes 123.00. In other words it gains a decimal point and a couple of zeroes.

This is because the default (or initial) conditions of the spreadsheet decrees that all numbers should have two decimal places. So if you give the program a number that hasn't, say 34, it tags a couple on for you in the form of zeroes. Of course 34.00 is the same as 34 so there's no harm done.

However, what if you want to use a number with three or more decimal places such as 1.459? The default conditions only allow two decimal places while 1.459 has three (or else there's been a misprint!). Something's got to give. Or so it seems.

Actually nothing really gives as the spreadsheet becomes mildly schizophrenic. As the program only allows two decimal places to be shown on the spreadsheet that's all you get.

The number 1.459 is rounded to the nearest figure with two decimal points, 1.46, so this is what's displayed. Don't take my word for it, try it and see for yourself. A number like 23.452 will appear as 23.45. Play around with a few figures until you see what happens and get used to the way that the spreadsheet displays decimal numbers.

And the keyword is "displays". While that's the way the micro is forced to show the cell's contents on the screen, it's not the way that the program remembers them. Never mind the rounding that has to be done to fit the number on to the screen, the micro still recalls what the number was meant to be and uses the original, unrounded figure in its calculations.

Try entering 1.459 into cell A1 of a newly-created spreadsheet. As explained above, it will appear as 1.46. However, if you look at the status area, the bit of the screen above the grid of cells, you'll see a line saying:

```
Contents=1.459
```

So while the display might say one thing, the micro knows the facts of the matter. And when it comes to doing calculations it uses the proper values. For example with 1.459 in cell A1 (showing 1.46 on the screen) we can enter the formula A1*100 in cell A2 and see the result, 145.90, displayed in cell A2. Notice that the calculation performed is 100 times 1.459, *not* 100 times 1.46 which would give 146.00. Also notice that we are still stuck with our two decimal places.

This can be changed. We can alter the number of decimal places a particular cell can display. To show this move the cursor to cell A1, making that the active cell and press the Control and function key *f5* at the same time. The message:

```
Enter number of decimal places (0-7):
```

appears in the status area.

If we reply with 3 cell A1 now displays 1.459. With the extra decimal place the program can display the real value of A1's contents. Pressing Control + *f5* again and replying 4 to the prompt, forces the program to display four decimal places. The result is that A1 now holds 1.4590.

So that's how we can change the number of decimal places displayed in any one cell.

One thing to be aware of is that this doesn't affect other cells. If you've been following this on your micro (and you should) you'll see that the contents of cell B1 stay stubbornly at 145.90.

We're not just stuck to changing the number of decimal points shown in solitary cells. We can do the same thing for whole columns. Try putting 1.333 in cell A2. As you should expect by now, 1.33 is displayed, though the status area shows the true state of affairs with:

```
Contents=1.333
```

Enter the formula A2/3 into cell B2 and you'll see 0.44 appear here. Now suppose that you want this to be displayed to three decimal places. In fact, you want all of column B to be shown this way. It couldn't be easier. Just make a cell in column B active by moving the cursor there then press Shift

→

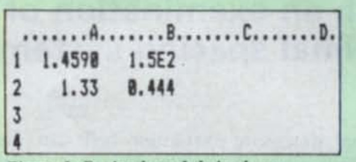
From Page 129

+ *f5* at the same time. Again the:

```
Enter number of decimal places (0-7):
```

prompt shows. Only now, if you reply with 3 you'll see that not only is B2 shown to three decimal places (0.444), so is B1. Well not quite. In the default column width there's not enough space for 145.900, so the number is displayed in the exponential form 1.5E2 (1.5 multiplied by 10 to the power 2).

Strange as this may appear, the contents of the cell are unchanged. It's just the display that's different. Figure I shows the appearance of the spreadsheet if you've done everything I've said so far.



```
  .......A.......B.......C.......D.
1 1.4590  1.5E2
2   1.33  0.444
3
4
```

Figure I: Decimals and their places

Once you've grasped the joys of displaying decimal points on your spreadsheet we can look at another aspect of the screen display – justification.

All that this refers to is whether a label or number is positioned to the left or right of a cell. Start a new spreadsheet and try entering the text LABEL in cell A1. You'll see that the final L of LABEL is in the rightmost space of the cell.

Similarly if you enter the figure 1 into cell B1 you'll see that the final 0 of the resulting 1.00 is in B1's rightmost space. Again this is right justification and it's the default condition.

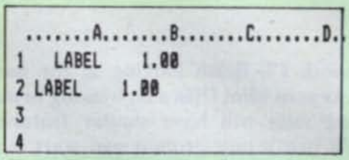
As you might expect with something as flexible as a spreadsheet, we're not stuck with this. To see how we can change it, make the second row a copy of the first with LABEL in A2 and 1 in B2. Now let's alter the justification of cell A2. This is done by making cell A2 active and then pressing Control + *f6*. As soon as this is done the message:

```
Cell justify (L/R) :
```

appears in the status area. Since the cell is already right justified, press L to select left justification and then Return. The result is that LABEL appears to leap to the left, the first L taking up the leftmost space of A2.

It's the same if we move to cell B2 and press Control + *f6* replying to the prompt with L. The figure in the cell jumps to the left, the 1 now taking up the first space of the cell.

Figure II shows the result of what we've done so far. Row 1 is right justified, row 2 is left justified.



```
  .......A.......B.......C.......D.
1   LABEL    1.00
2 LABEL    1.00
3
4
```

Figure II: A matter of justification

While the justification used doesn't affect the working of the spreadsheet, it can make it easier to read. One point to bear in mind is that right justification makes columns of figures easier to read, as all the decimal points line up under each other (provided the number of decimal places is the same for each cell). And we can justify whole columns by using a combination of the Shift + *f6* and replying to the prompt as above.

There are two more combinations of Shift + a function key available in Mini Office II. The first, Shift + *f7*, allows you to change the display's text colour if you're not in Mode 7. The second, Shift + *f8*, alters the background colour. Sadly I can't testify as to their effectiveness as my model B's lack of memory won't allow me to use them! Never mind, I prefer things in black and white.

Our final combination of keys doesn't use a function key at all. It consists of pressing the Control and Copy keys at the same time. This allows you to edit the formula in the active cell using the cursor and Delete keys.

Suppose that cell D4 contains the formula A3+B2 and you decide to change it to A3-B1 to see what happens. You can, of course, just enter the new formula but let's not do that. Instead, make D4 the active cell and press Control and Copy at the same time. The result is that a copy of the formula appears in the status area along with a flashing cursor. The latter can be moved backwards and forwards along the formula by pressing the appropriate arrow key *and* the Control key. At any point a character can be inserted into the formula (the others making room for it) or deleted by using the Delete key.

In the case of A3+B2 we'd use the arrow keys to move the cursor to the right of the plus sign and delete it by pressing the Delete key.

We could then just type in the minus, move the cursor to the right of the 2, press Delete again to get rid of it and then type in 1. This has A3-B1 appearing in the status area. Pressing Return now moves the altered formula to the cell itself.

In this case using the editing function is a bit silly, we'd be better off just typing in the new formula. However where we're copying or altering a complicated formula it comes into its own.

● *And that's where we come to the end of a fairly indepth tour through Mini Office II and, at the same time, the basic functions of most spreadsheets. Next month we'll look at some of the other facilities available and how they are used.*

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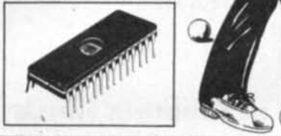

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From Page 47

```
  10 REM Animated Sprites
  20 REM By R.A.Waddilove
  30 REM (c) Micro User
  40 RESTORE 1450:FOR I%=0 TO 191:READ J%:I%?&C00=J%:NEXT
  50 PROCassemble
  60 MODE 2:*FX16
  70 VDU 23;8202;0;0;0;
  80 VDU 19,7,6;0;
  90 VDU 19,5,6;0;
 100 VDU 19,8,6;0;
 110 VDU 19,9,1;0;
 120 VDU 19,11,3;0;
 130 GCOL 0,2:DRAW 0,1023:DRAW 1278,1023:DRAW 1278,0:DRAW 0,0
 140 GCOL 0,4:MOVE 96,120:PLOT 17,0,780:PLOT 17,1068,0:PLOT 17,0,-780:PLOT 17,-1068,0
 150 COLOUR 6:PRINT TAB(2,10)"Use ";:COLOUR 8:PRINT "cursor ";:COLOUR 6:PRINT "keys!"
 160 CALL &900
 170 END
 180
 190 DEF PROCassemble
 200 old=&70:new=&72:rows=&74:columns=&75:temp=&76:temp1=&78:temprows=&7A
 210 address=&80:x%=&82:y%=&83:frame=&84
 220 osbyte=&FFF4
 230 FOR pass=0 TO 2 STEP 2
 240 P%=&900
 250 [ OPT pass
 260
 270 .initialise
 280 LDA #&80:STA old:STA old+1  \set old address
 290 LDX #35:STX x%:LDY #128:STY y% \set your x,y
 300 JSR convert  \get address
 310 LDA new:STA address:LDA new+1:STA address+1  \save address
 320 LDA data:STA newdata+1:LDA data+1:STA newdata+2  \set data
 330 LDA #0:STA frame  \frame of animation
 340 LDX #4:LDY #12:JSR print
 350
 360 .start
 370 LDA #19:JSR osbyte
 380 LDY frame
 390 LDA data,Y:STA olddata+1:LDA data+1,Y:STA olddata+2  \set old data
 400 TYA:CLC:ADC #2:AND #7:TAY:STY frame  \next frame
 410 LDA data,Y:STA newdata+1:LDA data+1,Y:STA newdata+2  \set new data
 420 LDA address:STA old:LDA address+1:STA old+1  \set old
 430 JSR readkeys
 440 LDX x%:LDY y%:JSR convert  \get new address
 450 LDA new:STA address:LDA new+1:STA address+1  \save address
 460 LDA &240:.fx19 CLI:SEI:CMP &240:BEQ fx19
 470 LDX #4:LDY #12:JSR print
 480 LDA #&81:LDX #&8F:LDY #&FF:JSR osbyte:TYA:BEQ start  \Escape pressed?
 490 RTS  \return to Basic
 500
 510 .readkeys  \right
 520 OPT FNinkey(-122):BEQ left
 530 LDA x%:CMP #68:BEQ notright:INC x%
 540 .notright
 550 RTS
 560 .left
 570 OPT FNinkey(-26):BEQ up
 580 LDA x%:CMP #7:BEQ notleft:DEC x%
 590 .notleft
 600 RTS
 610 .up
 620 OPT FNinkey(-58):BEQ down
 630 LDA y%:CMP #34:BEQ notup:DEC y%:DEC y%
 640 .notup
 650 RTS
 660 .down
 670 OPT FNinkey(-42):BEQ notdown
 680 LDA y%:CMP #212:BEQ notdown:INC y%:INC y%
 690 .notdown
 700 RTS
 710
 720 .put
 730 LDA #&80:STA old:STA old+1
 740 .print  \uses new/old/X=rows/Y=columns/olddata/newdata
 750 STX columns:STY rows
 760 LDX #0:LDY #0
 770 LDA new:STA temp1:LDA new+1:STA temp1+1
 780 LDA old:STA temp:LDA old+1:STA temp+1  \save address of column
 790 .loop1
 800 LDA rows:STA temprows
 810 .loop2
 820 .newdata LDA &3000,X:EOR (new),Y:STA (new),Y
 830 .olddata LDA &3000,X:EOR (old),Y:STA (old),Y
 840 INX:BNE noinc:INC olddata+2:INC newdata+2  \next data byte
 850 .noinc
 860 LDA old:AND #7:CMP #7:BEQ bottom1
 870 INC old:BNE next1:INC old+1:JMP next1
 880 .bottom1 \row
 890 CLC:LDA old:ADC #&79:STA old:LDA old+1:ADC #2:STA old+1
 900 .next1
 910 LDA new:AND #7:CMP #7:BEQ bottom2
 920 INC new:BNE next2:INC new+1:JMP next2
 930 .bottom2
 940 CLC:LDA new:ADC #&79:STA new:LDA new+1:ADC #2:STA new+1
 950 .next2
 960 DEC temprows:BNE loop2  \next row
 970 CLC:LDA temp1:ADC #8:STA new:STA temp1:LDA temp1+1:ADC #0:STA new+1:STA temp1+1
 980 LDA temp:ADC #8:STA old:STA temp:LDA temp+1:ADC #0:STA old+1:STA temp+1
 990 DEC columns:BNE loop1  \next column
1000 RTS
1010
1020 .data  \character data
1030 OPT FNequw(&C00)
1040 OPT FNequw(&C00+48)
1050 OPT FNequw(&C00+2*48)
1060 OPT FNequw(&C00+3*48)
1070
1080 .convert  \X,Y -> address in new
1090 LDA #0:STA new+1:TXA:ASL A:ASL A:ROL new+1:ASL A:ROL new+1:STA new \X*8
1100 TYA:AND #7:ADC new:STA new:LDA new+1:ADC #0:STA new+1 \ +(Y MOD 8)
1110 TYA:LSR A:LSR A:LSR A:ASL A:TAY \2*(Y DIV 8)
1120 LDA table,Y:ADC new:STA new:LDA table+1,Y:ADC new+1:STA new+1
1130 RTS
1140
1150 .table
1160 OPT FNtable
1170 ]
1180 NEXT
1190 ENDPROC
1200
1210 DEF FNtable
1220 FOR I%=0 TO 31
1230 ?P%=(&3000+I%*&280)MOD256
1240 P%?1=(&3000+I%*&280)DIV256
1250 P%=P%+2
1260 NEXT
1270 =pass
1280
1290 DEF FNequw(word)
1300 ?P%=word MOD256
1310 P%?1=word DIV256
1320 P%=P%+2
1330 =pass
1340
1350 DEF FNinkey(number)
1360 [ OPT pass
1370 LDA #&81
1380 LDY #&FF
1390 LDX #number+256
1400 JSR osbyte
1410 TYA
1420 ]
1430 =pass
1440
1450 REM BALL0
1460 REM X=4/Y=12
 1470 DATA 0,1,1,3,15,7,7,15,3,1,1,0,
3,3,3,3,15,15,15,15,3,3,3,3,7,3,3,3,1
5,7,7,15,3,3,3,7,0,2,2,3,15,15,15,15,
3,2,2,0
 1480 REM BALL1
 1490 REM X=4/Y=12
 1500 DATA 0,1,1,3,15,11,11,15,3,1,1,
0,3,3,3,3,15,15,15,15,3,3,3,3,11,3,3,
3,15,11,11,15,3,3,3,11,0,2,2,3,15,15,
15,15,3,2,2,0
 1510 REM BALL2
 1520 REM X=4/Y=12
 1530 DATA 0,1,1,3,15,15,15,15,3,1,1,
0,7,3,3,3,15,7,7,15,3,3,3,7,3,3,3,3,1
5,15,15,15,3,3,3,3,0,2,2,3,15,7,7,15,
3,2,2,0
 1540 REM BALL3
 1550 REM X=4/Y=12
 1560 DATA 0,1,1,3,15,15,15,15,3,1,1,
0,11,3,3,3,15,11,11,15,3,3,3,11,3,3,3
,3,15,15,15,15,3,3,3,3,0,2,2,3,15,11,
11,15,3,2,2,0
```

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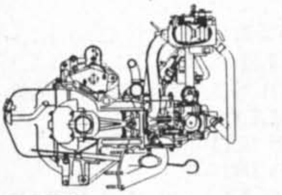

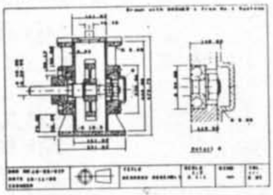

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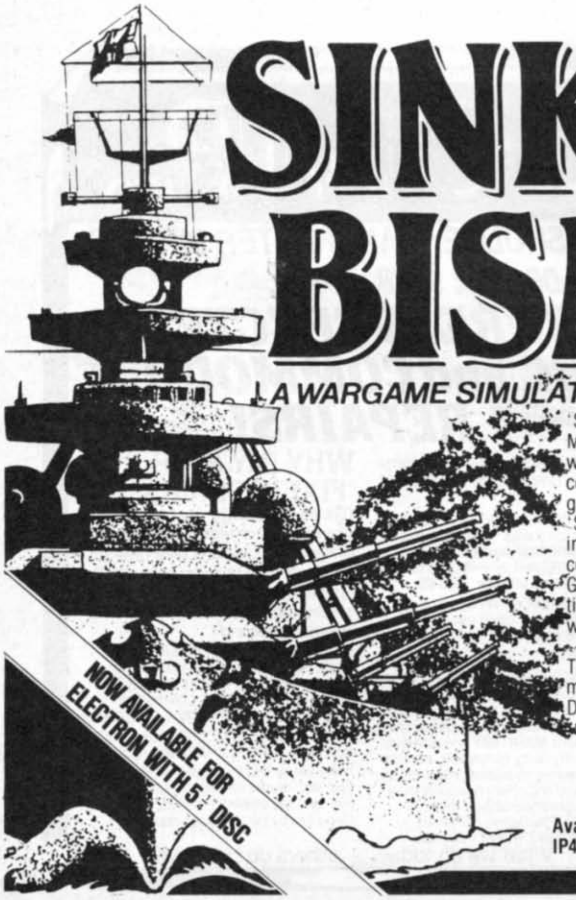

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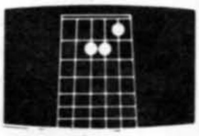
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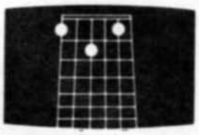
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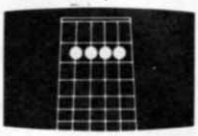
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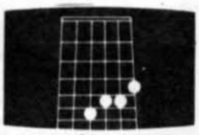
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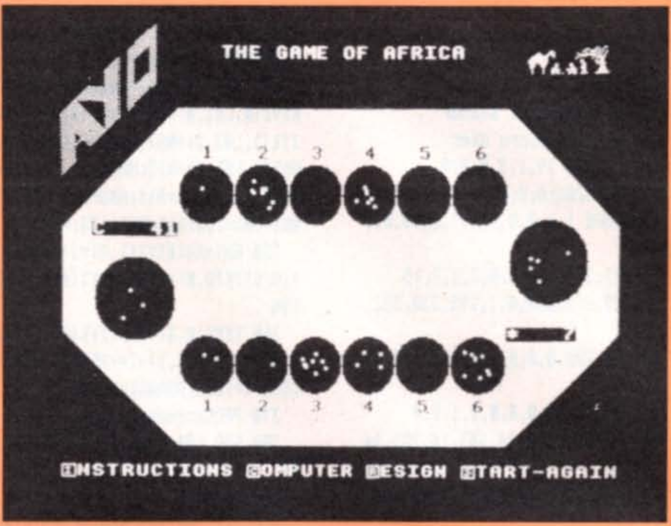
From Page 64

```
  10 REM AYO
  20 REM by DANIEL J. BISHOP
  30 REM (c) The Micro User
  40 MODE 4:VDU 19,1,3,0,0,0
  50 VDU 23;8202;0;0;0;
  60 ENVELOPE 1,1,0,0,0,1,1,0,80,0,0
,-2,80,80
  70 VDU 23,224,0,0,0,0,0,1,7,15
  80 VDU 23,225,0,0,0,1,195,230,252,
252
  90 VDU 23,226,0,0,0,128,192,192,64
,0
 100 VDU 23,227,0,0,0,0,2,1,2,4
 110 VDU 23,228,0,0,24,103,18,255,16
1,2
 120 VDU 23,229,0,70,168,170,82,164,
116,88
 130 VDU 23,230,31,31,14,14,12,4,4,4
 140 VDU 23,231,252,252,56,56,16,16,
16,16
 150 VDU 23,232,0,0,48,48,96,248,240
,218
 160 VDU 23,233,0,0,48,48,24,252,60,
108
 170 VDU 23,234,192,192,96,96,224,96
,96,240
 180 VDU 23,235,152,248,92,24,28,60,
62,255
 190 VDU 23,237,255,129,185,165,185,
165,129,255
 200 VDU 23,238,255,129,157,161,161,
157,129,255
 210 VDU 23,239,255,129,185,145,145,
185,129,255
 220 VDU 23,240,255,157,161,153,133,
185,129,255
 230 VDU 23,241,170,85,170,85,170,85
,170,85
 240 VDU 23,242,255,254,252,248,240,
224,192,128
 250 VDU 23,243,1,3,7,15,31,63,127,2
55
 260 VDU 23,244,10,5,10,5,10,5,10,5
 270 VDU 23,245,160,80,160,80,160,80
,160,80
 280 VDU 23,246,85,170,84,168,80,160
,64,128
 290 VDU 23,247,170,85,42,21,26,37,6
6,129
 300 VDU 23,248,1,2,5,10,21,42,85,17
0
 310 VDU 23,249,128,64,160,80,168,84
,170,85
 320 VDU 23,250,255,255,255,255,255,
255,255,255
 330 DIM HP%(5),H%(1,5),HT%(1,5),HXY
%(1,5,1),TXY%(1,1),SCORE%(1),SXY%(1,1
),SEED%(1),HNUM%(1,5,1)
 340 N0%=320:N1%=308:FOR L0%=0 TO 5:
HXY%(0,L0%,0)=N0%:HXY%(0,L0%,1)=266:H
XY%(1,L0%,0)=N0%:HXY%(1,L0%,1)=635:HN
UM%(1,L0%,0)=N1%:HNUM%(1,L0%,1)=736:H
NUM%(0,L0%,0)=N1%:HNUM%(0,L0%,1)=184:
N0%=N0%+128:N1%=N1%+128:NEXT
 350 RH%=64:SXY%(1,0)=160:SXY%(1,1)=
410:SXY%(0,0)=1120:SXY%(0,1)=492:RSH%
=90
 360 TXY%(0,0)=32:TXY%(0,1)=21:TXY%(
1,0)=3:TXY%(1,1)=14:MESX%=15:MESY%=17
:COMP%=TRUE:BOARD%=FALSE
 370 PROCscreendisplay
 380 FOR L0%=0 TO 1:SCORE%(L0%)=0:NE
XT
 390 TURN%=0
 400 PROCemptyhouses:BOARD%=TRUE:FOR
 L0%=0 TO 1:FOR L1%=0 TO 5:H%(L0%,L1%
)=4:NEXT:SEED%(L0%)=0:NEXT:PROCfillho
uses
 410 VDU 31,MESX%,MESY%:PRINT "START
 GAME":VDU 31,MESX%,MESY%:PROCbell:PR
OCpause(2):PRINTSTRING$(10,CHR$(250))
 420 PROCscorepanels
 430 *FX15,0
 440 IF COMP% AND TURN%=1 THEN HOUSE
%=FNcomputermove:GOTO 530
 450 USER$=GET$
 460 IF USER$="C" OR USER$="c" THEN
COMP%=NOT COMP%:GOTO 420
 470 IF USER$="S" OR USER$="s" THEN
750
 480 IF USER$="R" OR USER$="r" THEN
SCORE%((TURN%+1) MOD 2)=SCORE%((TURN%
+1) MOD 2)+(48-SEED%(TURN%)):SCORE%(T
URN%)=SCORE%(TURN%)+SEED%(TURN%):GOTO
 750
 490 IF USER$="I" OR USER$="i" THEN
PROCinstructions:PROCscreendisplay:BO
ARD%=FALSE:PROCemptyhouses:BOARD%=TRU
E:PROCfillhouses:PROCscorepanels:GOTO
 430
 500 HOUSE%=VAL(USER$):IF HOUSE%=0 O
R HOUSE%>6 THEN 450
 510 HOUSE%=HOUSE%-1
 520 IF H%(TURN%,HOUSE%)=0 THEN 450
 530 PROCscrunch:PROCdrawhouse(HXY%(
TURN%,HOUSE%,0),HXY%(TURN%,HOUSE%,1),
RH%):N2%=H%(TURN%,HOUSE%):H%(TURN%,HO
USE%)=0
 540 N0%=TURN%:N1%=HOUSE%:FOR L0%=1
TO N2%
 550 IF N0%=0 THEN N1%=N1%+1:IF N1%=
6 THEN N0%=1:N1%=5:GOTO 570
 560 IF N0%=1 THEN N1%=N1%-1:IF N1%=
-1 THEN N0%=0:N1%=0
 570 H%(N0%,N1%)=H%(N0%,N1%)+1
 580 PROCseed(N0%,N1%,0)
 590 PROCtok:PROCpause(0.5)
 600 NEXT
 610 IF H%(N0%,N1%)<2 OR H%(N0%,N1%)
>3 OR N0%=TURN% THEN 680
 620 REPEAT
 630 IF H%(N0%,N1%)=1 THEN 650
 640 SEED%(TURN%)=SEED%(TURN%)+H%(N0
%,N1%):PROCscrunch:PROCdrawhouse(HXY%
(N0%,N1%,0),HXY%(N0%,N1%,1),RH%):FOR
L0%=1 TO H%(N0%,N1%):PROCseed(0,-1,TU
RN%):PROCtok:PROCpause(0.3):NEXT:H%(N
0%,N1%)=0
 650 IF N0%=0 THEN N1%=N1%-1:IF N1%=
-1 THEN N0%=1:N1%=0:GOTO 670
 660 IF N0%=1 THEN N1%=N1%+1:IF N1%=
6 THEN N0%=0:N1%=5
 670 UNTIL N0%=TURN% OR H%(N0%,N1%)>
3
 680 TURN%=(TURN%+1) MOD 2
 690 N0%=0:FOR L0%=0 TO 5:N0%=N0%+H%
(TURN%,L0%):NEXT
 700 N1%=0:FOR L0%=0 TO 5:N1%=N1%+H%
((TURN%+1) MOD 2,L0%):NEXT
 710 IF N0%=0 THEN 740
 720 IF N0%<=1 AND N1%<=1 THEN 740
 730 GOTO 420
 740 FOR L0%=0 TO 1:SCORE%(L0%)=SCOR
E%(L0%)+SEED%(L0%):NEXT
 750 VDU 31,MESX%,MESY%:PRINT "GAME
OVER":PROCbell:VDU 31,MESX%,MESY%:PRO
Cpause(2):PRINT STRING$(9,CHR$(250))
 760 IF USER$="S" OR USER$="s" THEN
380
 770 GOTO 390
 780 DEF PROCscreendisplay
 790 VDU 31,6,0,245,31,5,1,248,245,3
1,4,2,244,246,245,31,3,3,248,244,32,2
45,31,3,4,241,244,248,245,10,13,32,24
8,241,241,244,246
 800 VDU 10,13,248,249,32,241,244,10
,13,241,241,249,246,10,13,241,247,246
,10,13,241,10,13,246
 810 VDU 5,18,0,0:MOVE 128,962:VDU 2
42:MOVE 196,886:VDU 243:MOVE 192,1024
:VDU 242:MOVE 128,810:VDU 243,4,18,0,
1
 820 VDU 31,11,2:PRINT "THE GAME OF
AFRICA"
 830 VDU 31,33,2,224,225,226,227,228
,229,31,33,3,230,231,232,233,234,235
 840 MOVE 256,819:MOVE 0,560:PLOT 85
,1024,819:PLOT 85,1280,560:MOVE 0,560
:PLOT 85,0,338:MOVE 1280,560:PLOT 85,
1280,338:MOVE 1024,82:PLOT 85,0,338:P
```

→

From Page 137



```
LOT 85,256,82
  850 GCOL 0,0:VDU 5:FOR L0%=0 TO 1:F
OR L1%=0 TO 5:MOVE HNUM%(L0%,L1%,0),H
NUM%(L0%,L1%,1):PRINT;L1%+1:NEXT:NEXT
:VDU4:GCOL 0,1
  860 VDU 31,0,31:PRINT CHR$(239)"NST
RUCTIONS "CHR$(238)"OMPUTER "CHR$(237
)"ESIGN "CHR$(240)"TART-AGAI";:MOVE 1
248,28:VDU 5,78,4
  870 ENDPROC
  880 DEF PROCemptyhouses
  890 FOR L0%=0 TO 1:FOR L1%=0 TO 5:I
F H%(L0%,L1%)>0 OR NOT BOARD% THEN PR
OCdrawhouse(HXY%(L0%,L1%,0),HXY%(L0%,
L1%,1),RH%)
  900 NEXT:NEXT
  910 FOR L0%=0 TO 1:PROCdrawhouse(SX
Y%(L0%,0),SXY%(L0%,1),RSH%)
  920 NEXT
  930 ENDPROC
  940 DEF PROCfillhouses
  950 FOR L0%=0 TO 1:FOR L1%=0 TO 5:L
2%=1
  960 IF H%(L0%,L1%)=0 THEN 980
  970 REPEAT:L2%=L2%+1:PROCseed(L0%,L
1%,0):UNTIL L2%>H%(L0%,L1%)
  980 NEXT
  990 L2%=1:IF SEED%(L0%)=0 THEN 1010
 1000 REPEAT:L2%=L2%+1:PROCseed(0,-1,
L0%):UNTIL L2%>SEED%(L0%)
 1010 NEXT
 1020 ENDPROC
 1030 DEF PROCdrawhouse(X0%,Y0%,R0%)
 1040 GCOL 0,0:FOR X1%=-R0% TO R0% ST
EP 4:Y1%=SQR(R0%^2-X1%^2):MOVE X0%+X1
%,Y0%+Y1%:DRAW X0%+X1%,Y0%-Y1%:NEXT:G
COL 0,1
 1050 ENDPROC
 1060 DEF PROCscorepanels
 1070 FOR L0%=0 TO 1
 1080 VDU 31,TXY%(L0%,0),TXY%(L0%,1):
IF TURN%=L0% THEN VDU42 ELSE VDU32
 1090 PRINT RIGHT$(STRING$(4,CHR$(32)
)+STR$(SCORE%(L0%)),4)
 1100 NEXT
 1110 VDU 31,TXY%(1,0)-1,TXY%(1,1):IF
 COMP% THEN VDU67 ELSE VDU250
 1120 ENDPROC
 1130 DEF PROCseed(N0%,N1%,N7%)
 1140 IF N1% THEN MOVE SXY%(N7%,0),SX
Y%(N7%,1):N2%=RND(1)*RSH%*0.5:N3%=RND
(1)*RSH%*0.5
 1150 IF N1%<>TRUE THEN MOVE HXY%(N0%
,N1%,0),HXY%(N0%,N1%,1):N2%=RND(1)*RH
%*0.5:N3%=RND(1)*RH%*0.5
 1160 IF RND(1)<0.5 THEN N4%=-1 ELSE
N4%=1
 1170 IF RND(1)<0.5 THEN N5%=-1 ELSE
N5%=1
 1180 PLOT 64,N2%*N4%-12,N3%*N5%+24:V
DU 5,46,4
 1190 ENDPROC
 1200 DEF PROCscrunch
 1210 SOUND 4,1,6,2
 1220 ENDPROC
 1230 DEF PROCtok
 1240 SOUND 4,-10,6,1
 1250 ENDPROC
 1260 DEF PROCpause(TM)
 1270 TM=TM*100:TIME=0
 1280 REPEAT UNTIL TIME>TM
 1290 ENDPROC
 1300 DEF PROCbell
 1310 SOUND 1,1,197,2
 1320 ENDPROC
 1330 DEF FNcomputermove
 1340 FOR L0%=0 TO 5:HP%(L0%)=0:NEXT
 1350 FOR L0%=0 TO 5
 1360 IF H%(1,L0%)=0 THEN HP%(L0%)=-1
000:GOTO 1630
 1370 FOR L1%=0 TO 1:FOR L2%=0 TO 5
 1380 HT%(L1%,L2%)=H%(L1%,L2%)
 1390 NEXT:NEXT
 1400 N1%=L0%:N2%=1:N0%=HT%(1,L0%):HT
%(1,L0%)=0
 1410 FOR L1%=1 TO N0%
 1420 IF N2%=1 THEN N1%=N1%-1:IF N1%=
-1 THEN N2%=0:N1%=0:GOTO 1440
 1430 IF N2%=0 THEN N1%=N1%+1:IF N1%=
6 THEN N2%=1:N1%=5
 1440 HT%(N2%,N1%)=HT%(N2%,N1%)+1
 1450 NEXT
 1460 IF (HT%(N2%,N1%)=2 OR HT%(N2%,N
1%)=3) AND N2%=0 THEN N0%=TRUE ELSE N
0%=FALSE
 1470 FOR L1%=0 TO 11
 1480 IF HT%(N2%,N1%)>3 THEN N0%=FALS
E
 1490 IF N2%=0 THEN 1540
 1500 IF HT%(N2%,N1%)=0 THEN HP%(L0%)
=HP%(L0%)+3:GOTO 1600
 1510 IF HT%(N2%,N1%)=1 THEN HP%(L0%)
=HP%(L0%)-6:GOTO 1600
 1520 IF HT%(N2%,N1%)=2 THEN HP%(L0%)
=HP%(L0%)-9:GOTO 1600
 1530 IF HT%(N2%,N1%)>=3 THEN HP%(L0%
)=HP%(L0%)+6:GOTO 1600
 1540 IF HT%(N2%,N1%)<2 THEN 1600
 1550 IF HT%(N2%,N1%)=2 AND NOT N0% T
HEN HP%(L0%)=HP%(L0%)+5:GOTO 1600
 1560 IF HT%(N2%,N1%)=2 AND N0% THEN
HP%(L0%)=HP%(L0%)+60:GOTO 1600
 1570 IF HT%(N2%,N1%)=3 AND NOT N0% T
HEN HP%(L0%)=HP%(L0%)-6:GOTO 1600
 1580 IF HT%(N2%,N1%)=3 AND N0% THEN
HP%(L0%)=HP%(L0%)+90:GOTO 1600
 1590 IF HT%(N2%,N1%)>3 THEN HP%(L0%)
=HP%(L0%)-7
 1600 IF N2%=1 THEN N1%=N1%+1:IF N1%=
6 THEN N2%=0:N1%=5:GOTO 1620
 1610 IF N2%=0 THEN N1%=N1%-1:IF N1%=
-1 THEN N2%=1:N1%=0
 1620 NEXT
 1630 NEXT
 1640 N1%=0:N0%=HP%(0)
 1650 FOR L0%=1 TO 5:IF HP%(L0%)>N0%
THEN N0%=HP%(L0%):N1%=L0%
 1660 NEXT
 1670 FOR L0%=0 TO 5:IF HP%(L0%)=HP%(
N1%) THEN IF RND(1)<0.5 THEN N1%=L0%
```

```
 1680 NEXT
 1690 =N1%
 1700 DEF PROCinstructions
 1710 CLS:PRINT ''TAB(17)"AYO"
 1720 PRINT TAB(13)"INSTRUCTIONS"
 1730 PRINT '"In this game you may pl
ay against the"'"computer or a human
opponent."''"The computer always play
s the top row"'"of houses.  If the co
mputer is 'on', a"
 1740 PRINT "C is displayed in the to
p score panel."'"To turn the computer
 'on' or 'off',"'"press C during your
 turn."
 1750 PRINT '"The players play altern
ately.  The"'"player whose turn it is
, is shown by"'"an asterisk in the pl
ayer's"'"score panel."
 1760 PRINT '"When it is your turn, p
ress a number"'"corresponding to one
of your six"'"houses.  This house mus
t have at least"'"one seed in it."
 1770 PROCwait
 1780 PRINT "You will see your house
emptied, and"'"the contents sown, one
 by one,"'"anticlockwise around the b
oard."'"If the house into which the l
ast seed"'"is sown belongs to your op
ponent and"
 1790 PRINT "the total number of seed
s in that house"'"is 2 or 3 then the
contents of that"'"house are eaten."'
'"The object of the game is to eat se
eds."
 1800 PRINT "The eaten or 'captured'
seeds are"'"placed in your score hous
e."''"Furthermore, any preceding hous
es of"'"your opponent's which contain
 2 or 3"
 1810 PRINT "seeds, may also be eaten
 from -"'"providing that there are no
 intervening"'"houses of more than 3
seeds."
 1820 PROCwait
 1830 PRINT "Play continues in this w
ay, with each"'"player trying to eat
from his"'"opponent's houses."''"The
game will end when a player can not"
 1840 PRINT "move (because all his ho
uses are empty)"'"or both players hav
e less than 2 seeds"'"each.  Also a p
layer may resign during"'"his turn.
In so doing he forfeits all"
 1850 PRINT "the remaining seeds on t
he board to his"'"opponent."''"At the
 start of the next game, the"'"cumula
tive totals of seeds eaten are"'"disp
layed in each player's score panel."
 1860 PRINT '"If you wish to finish a
 game and reset"'"the scores to zero,
 press S during your"'"turn."
 1870 PROCwait
 1880 ENDPROC
 1890 DEF PROCwait
 1900 *FX 15,0
 1910 PRINT '"Press any key to contin
ue...";
 1920 S0$=GET$
 1930 CLS:PRINT
 1940 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 167.

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67 Powerful commands on this 16K Rom.
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NEWSLETTER

Eye on the weather

BELGIAN accountant Daniel Janssens wants fellow MicroLink subscribers to join him in setting up an international network of weather watchers on the system.

Before entering university 10 years ago he set up a simple network, corresponding with other amateur meteorologists in Europe, North America and the Middle East.

"Now I'm a fully qualified accountant my wish is to re-start my network with the help of modern means – computers and MicroLink", said Daniel.

He is looking for people in different countries who are prepared to report local weather conditions daily or monthly to his Brussels mailbox, MAG 95369.

Daniel is also interested in the effects of particular phenomena, such as storms, on the environment.

BOOST FOR EMPLOYMENT

HELPING local firms help themselves is the role of the business information office at Gateshead public library.

And helping Gateshead library to help local firms is the role of MicroLink.

The office was set up to provide free information to firms looking for customers and customers looking for suppliers.

The idea is to keep as much of Gateshead's business as possible within Gateshead – and thereby boost employment within the area.

In other words, whether buying or selling, when a local firm is looking for something it should search locally first before going outside the area.

Business Information Office spokesman Fraser Mackay said: "Our aim is to bring local firms together and encourage inter-trading, rather than see them go elsewhere for their components and raw materials.

"We joined MicroLink to gain access to its telex and electronic mail services and its overseas databases.

As we average 300 enquiries a month – half of them requiring in-depth research – it will help us to have a system that moves information quickly and reliably".

Telex service gets a boost

A FASTER telex service has been announced by MicroLink. It offers instant despatch of telexes to 150,000 users in Britain and more than two million worldwide.

Subscribers can send a telex from home or office in seconds, leaving the powerful MicroLink computer to deal with the drudgery of system bottlenecks.

The MicroLink computer has been chosen as the first in Britain to be modified because it handles such a large amount of telex traffic.

Head of MicroLink, Derek Meakin, said: "The improved telex facility is one that will save MicroLink subscribers time and money, certain in the knowledge their telexes are speeding on their way even faster than before".

Watchdog savages postmen

THE Post Office has been hammered yet again by its consumer watchdog organisation for failing to deliver the goods on time.

"Quality of service still falls below set targets, and overall services still fall short of customers' reasonable needs and expectations", says the Post Office Users National Council in its Customer Audit and Review for 1986.

More than 12 million of the 100 million first class letters posted each week are not reaching their destination the following day – "simply not good enough", says the report.

As much as 25 per cent of first class mail from London to the major cities of Edinburgh, Belfast, Glasgow, Manchester and Liverpool is not arriving on time.

And more than 20 per cent of first class items from Manchester, Glasgow and Belfast fails to reach London the following day. In the case of Belfast the failure rate is almost 30 per cent.

These statistics – the Post Office's own – are based only on the period between the item being timestamped and before it leaves the delivery office for its destination.

"This measurement system does not take account of delays in collection or initial handling, misdelivery or delays in actual delivery", says the report.

"Past experience has shown that letters posted at the same time in the same box can sometimes receive different timestamps or even not be cancelled until the day after posting, despite a collection being scheduled.

"In some areas the last collection of the day will be too late to connect with the despatches to remote areas of the country".

MicroLink News Editor Mike Cowley commented: "This report is yet another gloomy indictment of the postal system.

"Despite its so-called initiatives in the area of mobile sorting offices, rail and air links, the Post Office still fails to deliver a significant proportion of mail on time.

"Businesses just can't afford not to get into electronic mail if they want to compete effectively in the marketplace.

"A company that relies solely on the Post Office to get its message across is like a boxer with one arm tied behind his back".

YOUR chance to join MicroLink – turn to Page 149

From Page 54

```
590  BCC bad_ascii
600  CMP #ASC"~"
610  BCC final_ascii
620 .bad_ascii
630  LDA #ASC"."
640 .final_ascii
650  JSR oswrch
660  INY
670  CPY instruction_size
680  BNE print_ascii
690 .to_mnemonic_tab
700  JSR one_space
710  INY
720  CPY #6
730  BNE to_mnemonic_tab
740  LDY opcode
750  LDA mnemonic_type,Y
760  STA temp
770  ASL A
780  ADC temp
790  TAX
800  LDY #3
810 .print_mnemonic
820  LDA mnemonics,X
830  JSR oswrch
840  INX
850  DEY
860  BNE print_mnemonic
870  LDX #2
880  JSR multi_space
890  LDX opcode
900  LDY addr_mode,X
910  BEQ next_instruction
920  CPY #14
930  BNE not_a_branch
940  JSR relative_branch
950  JMP next_instruction
960 .not_a_branch
970  LDX text_pointers-1,Y
980 .print_addr_mode
990  INX
1000  LDA addr_mode_text-1,X
1010  PHP
1020  AND #&7F
1030  CMP #3
1040  BCS print_char
1050  TAY
1060  JSR read_memory
1070  JSR phex
1080  JMP check_last_char
1090 .print_char
1100  JSR oswrch
1110 .check_last_char
1120  PLP
1130  BPL print_addr_mode
1140 .next_instruction
1150  LDA instruction_size
1160  CLC
1170  ADC mem_loc
1180  STA mem_loc
1190  BCC next_instr2
1200  INC mem_loc+1
1210 .next_instr2
1220  RTS
1230 :
1240 .relative_branch
1250  LDA #ASC"&"
1260  JSR oswrch
1270  LDX mem_loc+1
1280  LDY #1
1290  JSR read_memory
1300  SEC
1310  PHP
1320  ADC #0
1330  BCC not_high
1340  INX
1350 .not_high
1360  PLP
1370  BMI back_branch
1380  ADC #0
1390  ADC mem_loc
1400  BCC print_ea
1410  INX
1420  BCS print_ea
1430 .back_branch
1440  EOR #&FF
1450  STA temp
1460  LDA mem_loc
1470  SBC temp
1480  BCS print_ea
1490  DEX
1500 .print_ea
1510  TAY
1520  TXA
1530  JSR phex
1540  TYA
1550 .phex
1560  PHA
1570  LSR A
1580  LSR A
1590  LSR A
1600  LSR A
1610  JSR pdigit
1620  PLA
1630  AND #&F
1640 .pdigit
1650  CMP #10
1660  BCC numeric
1670  ADC #6
1680 .numeric
1690  ADC #ASC"0"
1700  JMP oswrch
1710 .one_space
1720  LDA #ASC" "
1730  JMP oswrch
1740 .multi_space
1750  LDA #ASC" "
1760 .space2
1770  JSR oswrch
1780  DEX
1790  BNE space2
1800  RTS
1810 .read_memory
1820  STY temp
1830  STX tempx
1840  LDX mem_loc+1
1850  TYA
1860  CLC
1870  ADC mem_loc
1880  BCC read_mem2
1890  INX
1900 .read_mem2
1910  BIT tube_present
1920  BMI tube_routines
1930  STA rom_address
1940  STX rom_address+1
1950  LDY rom_number
1960  JSR osrdrm
1970 .exit_mem_read
1980  PHA
1990  LDX tempx
2000  LDY temp
2010  PLA
2020  RTS
2030 .tube_routines
2040  BIT tube_io_flag
2050  BMI read_tube_memory
2060  STA read_io_data
2070  STX read_io_data+1
2080  LDA #5
2090  LDX #read_io_data MOD 256
2100  LDY #read_io_data DIV 256
2110  JSR osword
2120  LDA read_io_data+4
2130  JMP exit_mem_read
2140 .read_tube_memory
2150  LDA (mem_loc),Y
2160  JMP exit_mem_read
2170 :
2180 .read_io_data
2190  OPT FNequb(5)
2200 .mnemonics
2210  OPT FNequs
2220 .addr_mode_text
2230  OPT FNread_string(13)
2240 .text_pointers
2250  OPT FNequb(13)
2260 .addr_mode_size
2270  OPT FNequb(15)
2280 .mnemonic_type
```

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POSTCODE ☐☐☐☐☐☐☐☐☐☐

TELEPHONE NUMBER (inc. Nat. dialling code) ☐☐☐☐☐☐☐☐☐☐ IS THIS BUSINESS? ☐
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*£66 for Residential Users. £112 denotes business user.

PLEASE ALLOW 28 DAYS FOR DELIVERY.

MU 1/87

From Page 141

```
 2290  OPT FNequb(256)
 2300 .addr_mode
 2310  OPT FNequb(256)
 2320 ]NEXT
 2330 IF P%<>&155D VDU7:PRINT"Object
code incorrect length"'"check program
!":END
 2340 *SAVE cmosdis 1100 155D
 2350 END
 2360 :
 2370 DEF FNequb(num%)
 2380 FOR loop%=0 TO num%-1
 2390 READA%:?(P%+loop%)=A%
 2400 NEXT
 2410 P%=P%+num%
 2420 =pass
 2430 :
 2440 DEF FNequs
 2450 READ text$
 2460 $P%=text$
 2470 P%=P%+LEN$P%
 2480 =pass
 2490 :
 2500 DEF FNread_string(end%)
 2510 FOR modes%=1 TO end%
 2520 READ addrmde$
 2530 FOR letter%=1 TO LENaddrmde$
 2540 A%=ASC(MID$(addrmde$,letter%,1)
)
 2550 IF A%=ASC("L") A%=1 ELSE IF A%=
ASC("H") A%=2
 2560 A%=A%+(letter%=LENaddrmde$)*-&8
0
 2570 ?P%=A%:P%=P%+1
 2580 NEXT
 2590 PRINT~P%
 2600 NEXT
 2610 =pass
 2620 :
 2630 DATA 0,0,&FF,&FF,0
 2640 :
 2650 DATA ADCANDASLBCCBCSBEQBITBMIBN
EBPLBRABRKBVCBVSCLCCLDCLICLVCMPCPXCPY
DECDEXDEYEORINCINXINYJMPJSRLDALDXLDYL
SRNOPORAPHAPHPPHXPHYPLAPLPPLXPLYROLRO
RRTIRTSSBCSECSEDSEISTASTXSTYSTZTAXTAY
TRBTSBTSXTXATXSTYA???
 2660 DATA "A"
 2670 DATA "#&L"
 2680 DATA "&L"
 2690 DATA "&L,X"
 2700 DATA "&L,Y"
 2710 DATA "(&L)"
 2720 DATA "(&L),Y"
 2730 DATA "(&L,X)"
 2740 DATA "(&HL)"
 2750 DATA "(&HL,X)"
 2760 DATA "&HL"
 2770 DATA "&HL,X"
 2780 DATA "&HL,Y"
 2790 :
 2800 DATA0,1,4,6,&A,&E,&12,&18,&1E
 2810 DATA&23,&2A,&2D,&32
 2820 :
 2830 DATA1,1,2,2,2,2,2,2,2
 2840 DATA3,3,3,3,3,2
 2850 :
 2860 DATA11,35,64,64,59,35,2,64,37,3
5,2,64,59,35,2,64
 2870 DATA9,35,35,64,58,35,2,64,14,35
,25,64,58,35,2,64
 2880 DATA29,1,64,64,6,1,44,64,41,1,4
4,64,6,1,44,64
 2890 DATA7,1,1,64,6,1,44,64,49,1,21,
64,6,1,44,64
 2900 DATA46,24,64,64,64,24,33,64,36,
24,33,64,28,24,33,64
 2910 DATA12,24,24,64,64,24,33,64,16,
24,39,64,64,24,33,64
 2920 DATA47,0,64,64,55,0,45,64,40,0,
45,64,28,0,45,64
 2930 DATA13,0,0,64,55,0,45,64,51,0,4
3,64,28,0,45,64
 2940 DATA10,52,64,64,54,52,53,64,23,
6,61,64,54,52,53,64
 2950 DATA3,52,52,64,54,52,53,64,63,5
2,62,64,55,52,55,64
 2960 DATA32,30,31,64,32,30,31,64,57,
30,56,64,32,30,31,64
 2970 DATA4,30,30,64,32,30,31,64,17,3
0,60,64,32,30,31,64
 2980 DATA20,18,64,64,20,18,21,64,27,
18,22,64,20,18,21,64
 2990 DATA8,18,18,64,64,18,21,64,15,1
8,38,64,64,18,21,64
 3000 DATA19,48,64,64,19,48,25,64,26,
48,34,64,19,48,25,64
 3010 DATA5,48,48,64,64,48,25,64,50,4
8,42,64,64,48,25,64
 3020 :
 3030 DATA0,8,0,0,3,3,3,0,0,2,1,0,11,
11,11,0
 3040 DATA14,7,6,0,3,4,4,0,0,13,1,0,1
1,12,12,0
 3050 DATA11,8,0,0,3,3,3,0,0,2,1,0,11
,11,11,0
 3060 DATA14,7,6,0,4,4,4,0,0,13,1,0,1
2,12,12,0
 3070 DATA0,8,0,0,0,3,3,0,0,2,1,0,11,
11,11,0
 3080 DATA14,7,6,0,0,4,4,0,0,13,0,0,0
,12,12,0
 3090 DATA0,8,0,0,3,3,3,0,0,2,1,0,9,1
1,11,0
 3100 DATA14,7,6,0,4,4,4,0,0,13,0,0,1
0,12,12,0
 3110 DATA14,8,0,0,3,3,3,0,0,2,0,0,11
,11,11,0
 3120 DATA14,7,6,0,4,4,5,0,0,13,0,0,1
1,12,12,0
 3130 DATA2,8,2,0,3,3,3,0,0,2,0,0,11,
11,11,0
 3140 DATA14,7,6,0,4,4,5,0,0,13,0,0,1
2,12,13,0
 3150 DATA2,8,0,0,3,3,3,0,0,2,0,0,11,
11,11,0
 3160 DATA14,7,6,0,0,4,4,0,0,13,0,0,0
,12,12,0
 3170 DATA2,8,0,0,3,3,3,0,0,2,0,0,11,
11,11,0
 3180 DATA14,7,6,0,0,4,4,0,0,13,0,0,0
,12,12,0
```

Program II

```
   10 REM CMOS disassembler driver
   20 REM By Kevin Edwards
   30 IF PAGE<&1900 VDU7:PRINT"PAGE m
ust be &1900 or greater!":END
   40 ON ERROR VDU3:REPORT:PRINT" at
line ";ERL:END
   50 MODE7
   60 *LOAD cmosdis 1100
   70 PROCinit
   80 REPEAT
   90 PROCscreen
  100 REPEAT
  110 command$=GET$
  120 comm%=INSTR("DPRT",command$)
  130 UNTILcomm%
  140 PRINTcommand$
  150 IF comm%=1 PROCdisassemble
  160 IF comm%=2 PROCprinter
  170 IF comm%=3 PROCrom_number
  180 IF comm%=4 PROCtube_select
  190 UNTIL bored%
  200 DEFPROCinit
  210 *FX 12 2
  220 bored%=FALSE
  230 printer_on%=FALSE
  240 mem_loc=&70
  250 rom_number=&76
  260 tube_io_flag=&77
  270 tube_present=&78
  280 code_start=&1100
  290 A%=&EA:X%=0:Y%=&FF
  300 tube%=(USR(&FFF4) AND &FF00)/25
6
  310 IF tube%=&FF tube$="Present and
 selected" ELSE tube$="Not present"
  320 ?tube_present=tube%
  330 ?tube_io_flag=&FF
  340 ?rom_number=&F
  350 ENDPROC
  360 DEFPROCscreen
  370 CLS
  380 PRINT'"CMOS disassembler:"
  390 PRINT'CHR$(133)"ROM bank : &";~
?rom_number
  400 PRINTTAB(20,3)CHR$(134)"Printer
 : ";
  410 IF printer_on% PRINT"On" ELSE P
RINT"Off"
  420 PRINT'CHR$(131)"Tube : ";tube$
  430 PRINT'"Enter command (DPRT) ?"
  440 PRINT">";
  450 ENDPROC
  460 DEFPROCdisassemble
  470 REPEAT
  480 REPEAT
  490 PRINT'"Enter start address &";
  500 INPUT""start$
  510 start%=EVAL("&0"+start$)
  520 UNTIL start%>=0 AND start%<&100
00
  530 REPEAT
  540 PRINT'"Enter end address   &";
  550 INPUT""end$
  560 end%=EVAL("&0"+end$)
  570 UNTIL end%>=0 AND end%<&10000
  580 IF end%=FALSE end%=&FFFF
  590 UNTIL end%>=start%
  600 ?mem_loc=start% MOD 256
  610 mem_loc?1=start% DIV 256
  620 IF printer_on% VDU 2
  630 REPEAT
  640 CALL code_start
  650 IF NOT printer_on% REPEAT UNTIL
 GET
  660 UNTIL INKEY(-82) OR mem_loc?1*2
56+?mem_loc>end%
  670 VDU 3
  680 PRINT''"End....Press Space"
  690 REPEAT UNTIL INKEY(-99)
  700 ENDPROC
  710 DEFPROCrom_number
  720 IF tube%=&FF ENDPROC
  730 REPEAT
  740 PRINT'"Enter new ROM number &";
  750 INPUT""rom$
  760 rom%=EVAL("&0"+rom$)
  770 UNTIL rom%>=0 AND rom%<&10
  780 ?rom_number=rom%
  790 ENDPROC
  800 DEFPROCprinter
  810 printer_on%=NOT printer_on%
  820 ENDPROC
  830 DEFPROCtube_select
  840 IF tube%=FALSE ENDPROC
  850 ?tube_io_flag=?tube_io_flag EOR
 &FF
  860 IF ?tube_io_flag=FALSE tube$="P
resent but reading I/O memory" ELSE t
ube$="Present and selected"
  870 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 167.

QUAL-SOFT THOUGHTWARE **Sports simulations**

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The June and July issues of COMPUTER GAMER magazine reviewed 16 soccer simulations, including Ocean's MATCHDAY and INTERNATIONAL MATCHDAY (128k SP), Addictive's FOOTBALL MANAGER, Artic's WORLD CUP and WORLD CUP 2, US Gold's WORLD CUP CARNIVAL, Virgin's FA CUP, etc etc. MEXICO '86 was given a NOVA overall rating and 5 "planets" from 5 for Value for Money. Only one other game could equal this, Commodore's classic INTERNATIONAL SOCCER.

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This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

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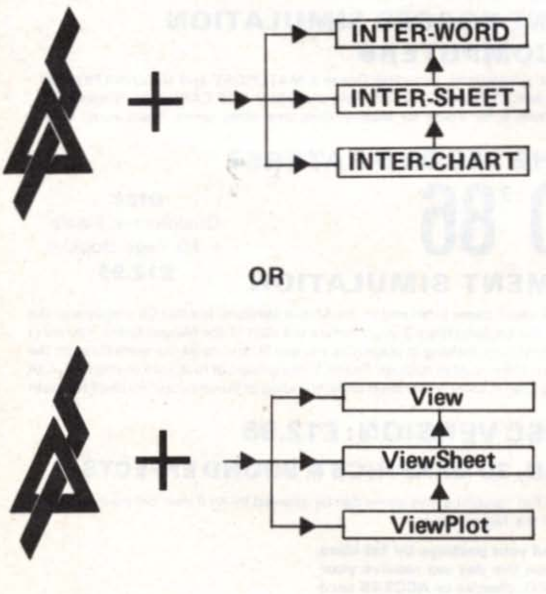

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Tournament sorts

MIKE COOK applies mainframe technique to a micro problem

THERE are several basic laws that govern the universe and one of them is that a computer will never have enough memory. The first computer I made had 256 bytes – not kilobytes, just bytes. At that time I remember saying that 4k was enough memory for anyone!

But by today's standards the BBC Micro is not overly blessed with memory, so I would like to look at the problem of sorting large data files and see how to squeeze a quart into a pint pot.

The problem is that to sort a file efficiently you have to have the whole of that file in memory at the same time.

True, you can do sorts with random access files but that involves a lot of disc access and can be very slow.

It is perfectly possible to have files much larger than the amount of memory you have available.

However, sorting a file of such a size can be a problem. I am not going to give you a sample program to do this as virtually every application involves a different set of constraints.

What I want to do is to show you how to go about writing such a program.

A technique of sorting large files was developed for main frame computers many years ago but I have never seen any mention of it in micro circles. It's known as a Tournament sort and is quite easy to follow.

Let's call the file we want to sort FRED and suppose it's too large to fit completely into memory at any one time.

So we make temporary files or "sons" of FRED, each one able to fit completely into memory as shown in Figure I.

We must make the number of sons of FRED a power of two, in other words two, four, eight or however many we need.

The sons are simply a part of the whole, so if we are creating four sons each file will have a quarter of the original records in it. Once these are created the original file FRED can be deleted to save disc space.

Then each son of FRED is placed wholly into memory, sorted with whatever technique you like and written back to disc, giving us four sorted sons, which are our candidates for the Tournament, as in Figure II.

Reading the first record of each file we fill the first four buffers, which we'll call semi-finals – a buffer is simply a variable or set of variables in your program representing the data record you want to sort.

We compare two of them, take the smaller (or larger if we are sorting in descending order) and place it into the final buffer.

We then do the same for the other two so that both final buffers are full.

The winning record from each semi-final buffer is replaced from the appropriate son of FRED file.

Now on to the final. Take the smallest entry in the buffer and write it out to a new file called Sorted FRED.

Replace the missing finalist from the appropriate semi-final and replace the successful semi-finalist, again from the appropriate son of FRED file.

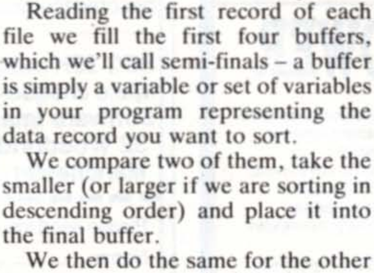

Figure I: Split up FRED into smaller files

You can see that if you continue this until all the sons of FRED files are empty you will have sorted the whole file.

Remember that some sons will run out of data before others. When this happens you must pad the buffers with dummy data which will lose in any tournament.

As soon as all buffers contain dummy data your sort is at an end.

You can now delete all the sons of FRED files and rename your sorted file FRED.

This technique can cope with any size of large file as each stage buffer only represents one record and so will not take up much space.

I think you can see how this can easily be extended to using eight sons of FRED by incorporating a quarter-final stage in your tournament.

To cope with really large files, the sons may even be on different discs.

If you delete the original FRED file before writing the sorted FRED you will avoid the dreaded "can't extend" error message, as the two files will be exactly the same length.

However, when adding records to FRED make sure that it is the last file on the disc – the last thing you saved – so the DFS can extend it.

So there you have it, you can now sort files as large as you like. ■

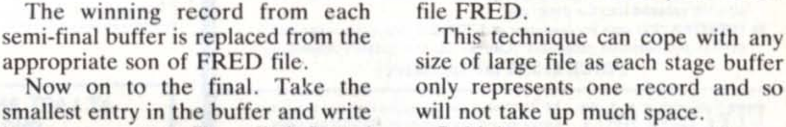

Figure II: Let the tournament begin

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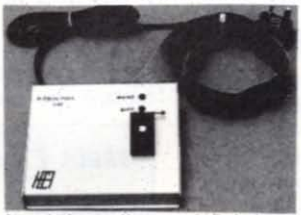

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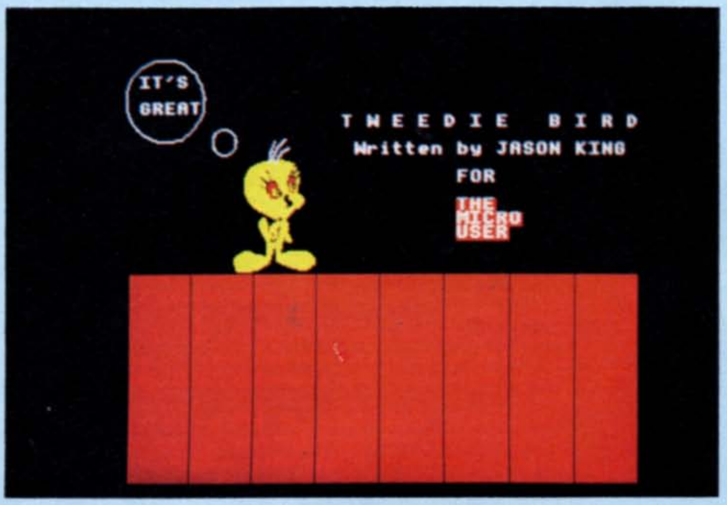
MU1

WAT
BI



IT'S GREAT

TWEEDIE BIRD
Written by JASON KING
FOR
THE MICRO USER

TWEETIE demonstrates the BBC Micro's hi-res Mode 1 graphics. In the program a bird will be drawn to show the cartoon-style graphics that can be achieved with only four colours.

The program itself is made up of seven procedures, of which four design and print the bird, and the others draw in the background, which adds to a better effect.

In the procedures *tweetie* and

```
   10 REM (C) The Micro User
   20 REM     Written by JASON KING
   30 REM        From LEICESTER
   40 REM
   50 REM       Save this program,
   60 REM     before running it...
   70 REM
   80 *TV255
   90 MODE1
  100 VDU23;8202;0;0;0;
  110 PROCchars
  120 PROCtweetie(300,805)
  130 PROCchars2
  140 PROCtweetie2(332,613)
  150 PROCmessage
  160 PROCfence
  170 PROCc(100,900,100)
  180 PROCc(250,800,30)
  190 dummy$=GET$:END
  200 DEFPROCchars
  210 VDU23,225,0,0,0,0,0,0,0,3
  220 VDU23,226,15,31,63,63,127,127,2
55,255
  230 VDU23,227,255,255,255,255,255,2
55,255,255
  240 VDU23,228,127,127,63,63,31,15,7
,3
  250 VDU23,229,0,0,0,0,1,31,255,255
  260 VDU23,230,255,127,15,3,0,24,60,
124
  270 VDU23,231,255,255,249,252,254,2
55,207,231
  280 VDU23,232,255,254,252,248,240,2
24,192,224
  290 VDU23,233,240,248,252,252,252,2
48,240,224
  300 VDU23,234,255,255,255,255,255,1
27,127,127
  310 VDU23,235,241,248,252,204,240,2
52,252,252
  320 VDU23,236,0,0,1,1,1,1,1,1
  330 VDU23,237,255,255,255,255,255,6
0,0,15
  340 VDU23,238,96,96,64,64,64,192,12
8,192
  350 VDU23,239,254,253,253,248,250,2
40,240,240
  360 VDU23,240,0,0,0,0,0,0,6,7
  370 VDU23,241,128,128,0,96,192,128,
32,96
  380 VDU23,242,15,7,7,3,3,49,52,48
  390 VDU23,243,0,224,240,248,200,128
,128,128
  400 VDU23,244,60,1,3,255,255,255,25
5,255
  410 VDU23,245,128,196,252,0,0,0,0,0
  420 VDU23,246,224,224,228,245,244,2
46,240,252
  430 VDU23,247,15,9,0,0,0,1,15,3
  440 VDU23,248,199,143,143,131,193,2
25,227,207
  450 VDU23,249,0,0,0,0,73,119,247,25
5
  460 VDU23,250,145,179,166,164,172,1
36,8,0
  470 VDU23,251,0,0,0,0,128,248,255,2
54
  480 VDU23,252,0,16,17,35,38,76,72,2
17
  490 VDU23,253,96,192,128,0,0,24,112
,192
  500 ENDPROC
  510 DEFPROCtweetie(X,Y)
  520 VDU5
  530 GCOL0,2
  540 MOVEX,Y-32:VDU225,229,249,251
  550 MOVEX,Y-64:VDU226,231,234,239,2
41
  560 MOVEX,Y-96:VDU227,235,242,246,2
38
  570 MOVEX,Y-128:VDU228,227,244,248,
233
  580 MOVEX+32,Y-160:VDU230,237,232
  590 GCOL0,1
  600 MOVEX+96,Y-64:VDU240
  610 MOVEX+32,Y-96:VDU236,243,247
  620 MOVEX+64,Y-128:VDU245
  630 GCOL0,3
  640 MOVEX+64,Y:VDU252,253
  650 MOVEX+64,Y-32:VDU250
```

CH THE RDIE

VARIABLES

xpos	x coordinate for circles.
ypos	y coordinate for circles.
radius	Radius of circles.
I	Sets the step for the circles.
I%	Draws the gaps in the fence.
X%	Height of fence.

PROCEDURES

chars	Defines graphics for PROCtweetie.
tweetie	Prints character for bird's head.
chars2	Defines graphics for PROCtweetie2.
tweetie2	Prints characters for bird's legs.
c	Draws the circles.
fence	Plots and fills in the fence.
message	Prints message.

By JASON KING

tweetie2, the MOVE and VDU commands, are used to print the characters, making it easier to print the multi-coloured sprites used on the bird's head.

Procedures *chars* and *chars2* set up the user-defined graphics used for drawing the bird, with procedure *c* drawing a "thought bubble".

```
 660 VDU4
 670 ENDPROC
 680 DEFPROCchars2
 690 VDU23,225,126,126,126,62,62,30,
31,15
 700 VDU23,226,63,127,253,249,243,25
1,155,219
 710 VDU23,227,240,240,240,240,240,2
24,240,248
 720 VDU23,228,7,7,3,3,3,3,3,3
 730 VDU23,229,187,167,15,255,255,25
5,239,206
 740 VDU23,230,184,188,156,0,0,0,0,0
 750 VDU23,231,1,7,31,63,127,127,127
,127
 760 VDU23,232,240,252,255,255,255,2
55,255,255
 770 VDU23,233,3,3,227,255,255,255,2
55,254
 780 VDU23,234,206,206,143,143,143,1
5,3,0
 790 VDU23,235,31,255,255,255,255,25
5,255,255
 800 VDU23,236,255,255,255,255,255,2
55,255,255
 810 VDU23,237,0,192,224,240,248,248
,248,248
 820 VDU23,239,63,63,63,31,15,0,0,0
 830 VDU23,240,255,255,255,248,128,0
,0,0
 840 VDU23,241,248,224,128,0,0,0,0,0
 850 VDU23,242,31,3,0,0,0,0,0,0
 860 VDU23,243,255,255,63,0,0,0,0,0
 870 VDU23,244,224,192,0,0,0,0,0,0
 880 ENDPROC
 890 DEFPROCtweetie2(X,Y)
 900 VDU5
 910 GCOL0,2
 920 MOVEX,Y:VDU225,226,227
 930 MOVEX,Y-32:VDU228,229,230
 940 MOVEX-64,Y-64:VDU231,232,233,23
4,235,236,237
 950 MOVEX-64,Y-96:VDU239,240,241
 960 MOVEX+64,Y-96:VDU242,243,244
 970 VDU4
 980 ENDPROC
 990 DEFPROCmessage
 1000 PRINTTAB(1,2)"IT'S"
 1010 PRINTTAB(1,4)"GREAT"
 1020 PRINTTAB(17,5)"T W E E D I E
B I R D"
 1030 PRINTTAB(18,7)"Written by JASON
 KING"
 1040 PRINTTAB(26,9)"FOR"
 1050 COLOUR3:COLOUR129
 1060 PRINTTAB(26,11)"THE"
 1070 PRINTTAB(26,12)"MICRO"
 1080 PRINTTAB(26,13)"USER"
 1090 ENDPROC
 1100 DEFPROCfence
 1110 VDU5
 1120 X%=500
 1130 FORI%=0TO1240STEP160
 1140 GCOL0,1
 1150 MOVEI%+4,X%
 1160 MOVEI%+4,0
 1170 PLOT85,I%+160,X%
 1180 PLOT85,I%+160,0
 1190 GCOL0,0
 1200 MOVEI%,X%
 1210 DRAWI%+160,X%
 1220 DRAWI%+160,0
 1230 NEXT
 1240 VDU4
 1250 ENDPROC
 1260 DEFPROCc(XPOS,YPOS,radius)
 1270 GCOL0,3
 1280 FORI=0 TO 2*PI STEP 0.1
 1290 MOVEXPOS,YPOS:MOVEXPOS+(radius*
COS(I)),YPOS+(radius*SIN(I)):DRAWXPOS
+(radius*COS(I+0.1)),YPOS+(radius*SIN
(I+0.1))
 1300 NEXT
 1310 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 167.

Here's a feast of games, utilities and educational programs!

MARCH 1985: Astromines, space action. **Castle,** two player catapult battle. **Data Maker,** take the tedium out of entering Data. **Disc Search,** string search utility. **Command,** give your BBC and Epson printer the same character set. **Break Key,** disable Break. ***Plus Flex – a machine code game.***

APRIL: X15, sideways-scrolling spectacular. **Mornington Crescent,** fun on the London underground. **Calculator,** AMX mouse mathematics. **Dithering,** colour mixer. **Chatterbox,** speech chip procedures. ***Plus Rabbit Run – a machine code game.***

MAY: Stellar Rescue, arcade action. **Dominoes,** simulation. **Plot69,** fast Mode 2 plot routine. **Musical Events,** a music interrupt utility. **Pound and Hash,** an Epson printer routine. **Sheila,** let your micro run your slide show.

JUNE: Othello, simulation of the board game. **Activities,** word association. **Catnap,** arcade enjoyment. **Simon Quackers,** superb lightpen game. **Shape recognition,** teach your micro to identify. **Stripper,** a routine for removing line numbers. **Epson,** a type-setting utility. **Lprint,** simplifies string output. **Eval,** using the Basic command from machine code.

JULY: Fly, an arcade spectacular. **Draughts,** a superb version. **Compox,** 3D noughts and crosses. **Double Height,** large characters in Modes 0-6. **Clock,** alarm utility. **Compacter,** compress Mode 2. **Inside Basic,** basic routines in machine code. **RAMpage and RAMsave,** sideways RAM utilities. **Video,** graphics to music.

AUGUST: Harbour Command, protect a Cornish town. **Fruit Machine,** a gambler's favourite. **Mouse Organ,** AMX mouse music utility. **Flash,** alternative flashing colours. **String Formatter,** prevent end of line word splitting. **M-C Games,** random number and key detection routines.

SEPTEMBER: Ball Lightning*, tame the lightning. **Quarters,** game of skill. **6502 Games,** a simple arcade game. **Variable Lister,** track your variables. **Smiley Hunt,** Al's game. **Error handling,** the vital routines.

OCTOBER: Karate, superb martial art action. **Solitaire,** all-time favourite. **Scroller,** text scroll utility. **Case,** an ON PROC command. **Disc Scan,** search for disc files. **Adventure,** avoid the vampire.

NOVEMBER: Whodunnit, solve the murder. **Gloop Gulp,** zany arcade action. **Basic Analyser,** take the drudgery of debugging. **Wordwise F-keys,** get the most from your word processor. **Sideways,** sideways screen clear. **New Modes,** Modes 8, 9 and 10. **Disabler,** prevent star command clashes.

DECEMBER: Wizard's Castle*, recover a diamond from the necromancer's lair. **Squares,** 'join the dots' strategy. **McBase,** powerful database. **Alphabet Train,** early spelling. **Basic Analyser,** the vital cross reference tables. **Wordsquare Creator,** to create your own puzzles. **Dumper,** how your programs affect memory. **Subhunt,** the final listing. ***Plus the listings from Body Building and Adventures.***

JANUARY 1986: Megaroids, exciting space action. **Claustrophobia,** can you get out of the maze in one piece? **Fives,** mind bending noughts and crosses. **Music Editor,** translate musical notation. **Wordsquare Solver,** the program to help you solve them. **Find and replace,** find and replace any item of text in a Basic listing. **Discopy,** copy and/or rename files. **S-sound,** sounds into electronic effects. **Alice,** another baffling problem.

FEBRUARY: Tipaka, can you escape the castle in one piece? **USS Endeavour,** fast and exciting action. **Ploy,** brain teasing strategy game. **Up-and-down-loader,** an aid for loading and saving. **Fast Verify,** verif saved disc files. **Disc Assembler,** assemble multi-part source files to disc. **Shift and Echo,** more electronic effects from the Body Building course. **8271,** using OSWORD to format a disc in a special way. **Elite Cheat,** the easy way to the top.

MARCH: Morris Miner, escape the mine in this levels and ladders spectacular. **Poster Puzzler,** a sliding block simulation. **Quicksort,** a fast machine code sort routine. **Character Sets,** create and display your own fonts. **8271,** four programs to complement the last article in the series. **Sound Sampler,** programs from the Body Building course. **Eleusis,** another mind bending puzzle from Alice.

APRIL: Ghouls of Azzod, can you escape from Azzod manor? **Mousetrap,** a simple but infuriating chase game. **Character Sets,** outputting characters using Epsom compatible bit-imaging. **Special Fonts,** create interesting displays with alternative fonts. **Notepad,** forget scraps of paper with this electronic jotter. **Hexer,** a loader for use in the machine code series. **Hyperspace,** another puzzler from Alice. **While Wend** and **While Wend Demo,** two listings from the mail pages.

MAY: Cavern Quest*, can you collect the diamonds before your oxygen runs out, avoiding the falling boulders as you go? **4-Site,** a 3-dimensional adaptation of noughts and crosses. **Catalog II,** disc operations achieved quickly with a single key press. **Taming the Tube,** turning the 6502 second processor on and off by software. **Character Sets,** creating slim characters for use in Modes 2 and 5. **Alice,** another intriguing puzzle from our adventurer.

JUNE: Pendragon*, can you keep the evil yellow perils away from the sugar cubes, while positioning the four diamonds? **Spacebase,** you must defend Earth from the invading hoarde of aliens. **Rainbow,** this lightpen graphics utility will keep you happy for hours.

JULY: Royal Wedding, celebrate the most exciting royal event of the decade with this superb sliding block puzzle. **Dual Catalog,** This utility provides 56 files on one side of a disc. **Viewgen,** what you see is what you get with this printer driver generator for View. ***PLUS digitised picture of Andrew and Sarah (disc only).***

AUGUST: Fruit Worm, can you survive the dangers of the deadly garden? **Upper,** force all your input into upper case. **Inkjet,** a printer test and two screen dumps for the ink jet printer. **Safer,** prevent accidentally overwritten files. **Hash,** a suite of programs illustrating searching techniques. **Geiger,** the software for the Body Building course.

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SEPTEMBER: Pear Picker, avoid Plastered Patrick in your attempts to become a professional fruit picker. **Basic Events,** control events from Basic. **Learner,** teach your word processor to remember those key sentences. **View Preview,** a useful program to preview pages of View files. **VDU19,** programs to demonstrate the illusion of animation. ***BONUS PROGRAMS: Rockfall and Any Questions (Mathematics and General studies).***

OCTOBER: Witch Hunt, search for the 42 keys of Transportal. **Coloured Lights,** an educational program to explain the GCOL effects. **Mode 7 Dumps,** screen dumps for Epson compatible or Olivetti Inkjet printers. **Text Compressor,** a clever utility to get long messages into short memory. **Auto Run,** star run Basic programs. **Weather Vane,** the program to complement the Body Building wind direction project. ***BONUS PROGRAMS: Quasimodo's Quest and Any Questions? (Music and Computer Studies).***

NOVEMBER: Maltese Cross, play this superb domino simulation. **Life,** the generation game to produce colourful patterns.

Star Print, a clever routine to give easy access to print styles. **View Ruler,** a handy program to provide View with a cursor on its ruler line. **Shadows,** an educational program to throw some light on the subject. **Dual Screens,** a routine to store two screens in memory at once. **BOS Editor,** a superb on-screen editor for Basic programs. **Body Building,** three programs for your pressure sensitive devices. ***PLUS three more files for Any Questions (Office practice, DIY, and Tables).***

DECEMBER: Santa's Sleigh, help Santa in his gift warehouse – but watch out for the monster spider. **Christmas Box,** a superb game of logic to test the old grey matter. **Tables,** take the tedium out of multiplication tests with this short but effective routine. **Flood Fill,** a versatile fast fill routine. **Scroller,** a machine code program to provide fast scrolling in any direction. **Speech,** a software utility to get your micro to talk back to you. **Break Recover,** hold on to variables when Break is pressed. **Body Building,** software for the relative humidity measure. ***PLUS Two more files for Any Questions (Arithmetic and Home Economics).***

JANUARY 1987: Ayo, the game of Africa, needing strategy and foresight. **Flying Fingers,** put your typing to the test in this fast arcade style test. **Function keys,** access 16 function keys while retaining full cursor editing. **Disassembler,** handles all 6502 and CMOS 65C02 instructions. **ADFS Menu,** step your way quickly through the hierarchical menu system. **Tweetie,** illustration of some of your micro's superb graphics capabilities. **Body Building,** the program for your BBC Micro drumkit. ***PLUS Two more files for Any Questions.***

** Not Master compatible.*

B+	✓
M	✓

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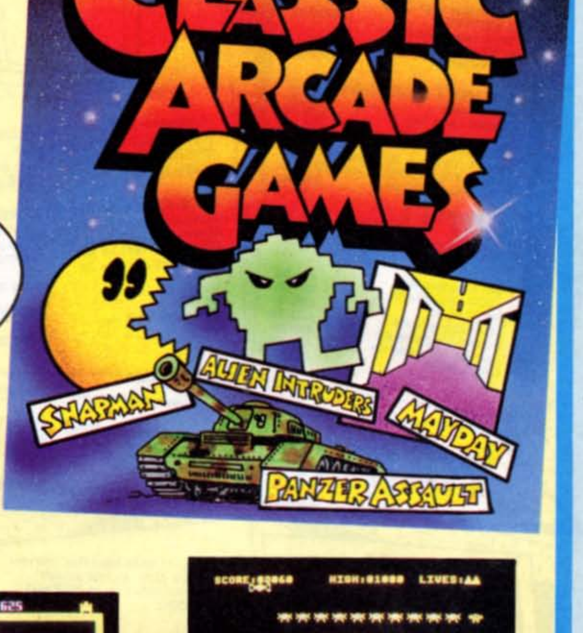
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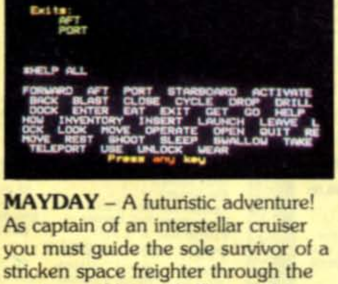

```
Mayday!
Location: Bridge
Contents: CYBERPILOT  DISK PACK

Exits:
    AFT
    PORT

*HELP ALL

FORWARD  AFT  PORT  STARBOARD  ACTIVATE
 BACK  BLAST  CLOSE  CYCLE  DROP  DRILL
 DOCK  ENTER  EAT  EXIT  GET  GO  HELP
HOW  INVENTORY  INSERT  LAUNCH  LEAVE  L
OCK  LOOK  MOVE  OPERATE  OPEN  QUIT  RE
MOVE  REST  SHOOT  SLEEP  SWALLOW  TAKE
 TELEPORT  USE  UNLOCK  WEAR
          Press any key
```

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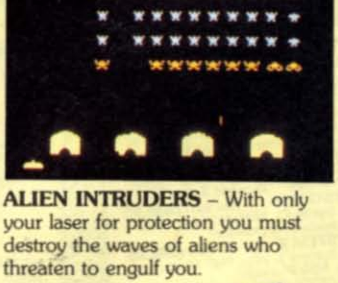
SCORE:00060 HIGH:01000 LIVES:

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Spectrum parallel interface	£40.25
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CBM 64 parallel interface	£19.95

COMPUTER CABLES

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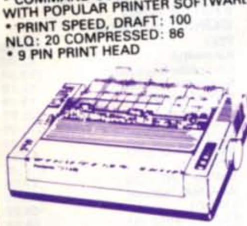
▸ Printers ▸

KX-P 1080 DOT MATRIX PRINTER

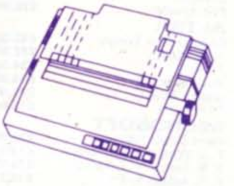
- NEAR-LETTER QUALITY PRINTING IN ALL PITCHES
- OPERATOR ACCESSIBLE PRINT MODE SELECTOR (Std./Pgm.,NLQ, Comp.)
- FRICTION FEED AND ADJUSTABLE TRACTOR ARE STANDARD
- WORD PROCESSING FUNCTIONS (Justification, Centering, L&R alignment)
- PROPORTIONAL SPACE PRINTING
- HIGH RESOLUTION, DOT-ADDRESSABLE GRAPHICS
- UP TO 40 DOWNLOADABLE CHARACTERS
- COMMAND CODE COMPATIBLE WITH POPULAR PRINTER SOFTWARE
- PRINT SPEED, DRAFT: 100 NLQ: 20 COMPRESSED: 86
- 9 PIN PRINT HEAD



The Panasonic KX-P 1080 impact dot matrix printer is ideal for applications that require economical high quality printing. It offers a variety of print modes, all producing crisp clearly formed characters. Wide choice of print sizes includes semi-compressed and commpressed (even in near-letter quality printing). Operator accessible print mode selector adds convenience. For a reliable printer at an affordable price, the KX-P 1080 is always a smart choice. **£159.00**

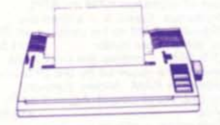
STAR NL-10

Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. For quality, ease of operation and dependability, nothing beats the Star NL-10. You get outstanding print quality at 120 cps in draft mode and 30 cps in near letter quality. Plus, the sleek NL-10 offers full compatibility with most popular computers through plug in interface cartridges. Just insert the appropriate plug in interface cartridge for your IBM-PC, Commodore, Apple IIc or other parallel computer and your Star NL-10 is ready to print. Touch a button on the control panel to set the print pitch (3 choices), to select the typeface and to print in either draft or NLQ mode. You can even set left and right margins, make top of form settings and control forward and reverse feed in the smallest pitch. **£229.00**



BROTHER M1109 NLQ

Printer 100cps Directional Logic Seeking Friction feed and secondary optional tractor feed **£189.00**



EPSON LX86

High performance low on price offering an increased performance at an incredible low price. The LX 86 Dot Matrix Printer represents unprecedented value for money, with a host of built in features, increased draft speed 120 cps and correspondence quality at 16 cps printing this versatile Epson printer carries out every task with effortless style and has the highest standard of reliability. Supports both Epson and IBM character set. (inc VAT)£229.00

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Canon 50A	£269.00
Canon 55A	£399.00
Brother EP 44	£228.00
Shinwa CP 80A	£189.00
MP 165	£240.00

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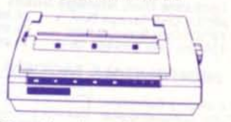
INTRODUCES THE NEW TECO VP1814



Dot matrix printer. VP1814 is fast highly reliable and easy to operate.

☆ Standard 80 column

☆The high-speed, low energy consumption 9 wire dot head gives printing speed of 189 cps and NLQ speed 36 cps

☆Bi-directional, Logic seeking in text mode

☆The use of fan-fold, roll or cut-sheet paper is possible with adjustable sproket pin feed and friction feed

☆Offers emphasized, double print, super script, sub script

☆Justified print mode are also available including left, centre, right and full justification

☆9 graphic modes are available

☆Both download and inprint buffer can exist simultaneously

☆7K input buffer standard can be expanded to 15K

☆Printing modes selectable at front panel (NLQ/draft, Pica/Elite, enlarge, emphasize, condense, italic

☆11 Language international character font is internalized

☆Both IBM and Epson compatable

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Juki 5510 - Gives you 180 CPS & NLQ Standards
£269.00 Inc. VAT

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

CITIZEN MSPIOE

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

STAR NB-15

High performance quality printer 300 cps draft, 100 cps LQ. 136 columns. Friction and tractor feed. Standard parallel interface. **£859.00**

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8K RS232 Interface	£85.00
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EPSON LQ800

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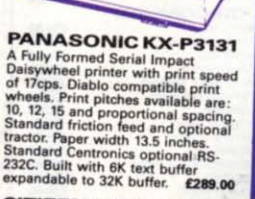
Juki 6100	£285.00
Juki 2200	£275.00
Juki 6300	£799.00



PANASONIC KX-P3131

A Fully Formed Serial Impact Daisywheel printer with print speed of 17cps. Diablo compatible print wheels. Print pitches available are: 10, 12, 15 and proportional spacing. Standard friction feed and optional tractor. Paper width 13.5 inches. Standard Centronics optional RS-232C. Built with 6K text buffer expandable to 32K buffer. **£289.00**

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Quendata DWP 1120	£114.00
Brother HR 15	£95.00
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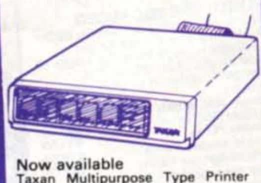
Printer Buffer



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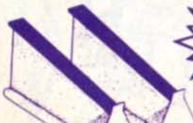
PRINTER STAND



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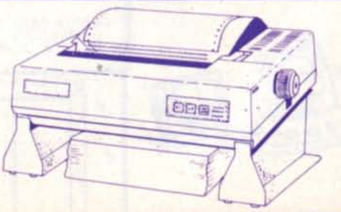

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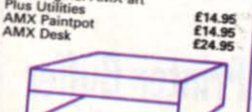

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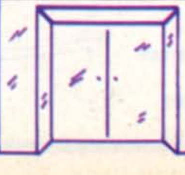

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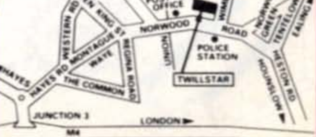

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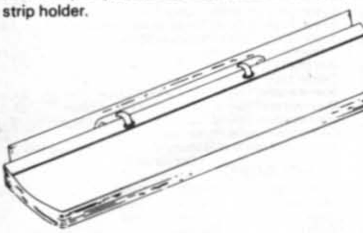

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Each holder comes with 10 clear plastic sleeves. Easily fitted to the BBC or BBC - Master series.

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Blank function strip cards	**£0.25**
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Function strip design software	**£4.50**
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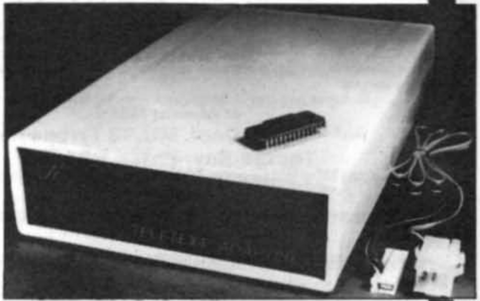

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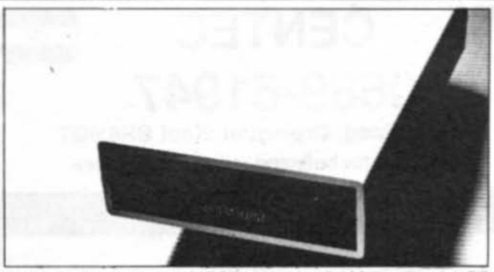

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£10 Prize letter

Give Spellcheck more word power

I AM writing in response to Mike Mahon's article in the March 1986 issue of The Micro User *about the Spellcheck rom.*

I use Spellcheck III extensively and find it an excellent piece of software. I do agree with the article that the only drawback is the limited dictionary size.

Unfortunately I have been away from work for the past five months following a back injury, which has limited my activities, but thankfully my BBC Micro and back editions of The Micro User *have helped me from going totally insane through boredom.*

I have put some of the time to good use and in doing so have overcome the disadvantage of the relatively small dictionary for Spellcheck by creating a number of files with the aid of a reliable dictionary and my word processor.

In doing so I have increased the size of my Spellcheck dictionary to almost 25,000 words on an 80 track disc.

I find that this huge increase has not affected the reading speed of text files as wondered by Mike, but of course it has greatly improved the efficiency of Spellcheck. I also estimate that there is room for several thousand more words on the disc.

The files created are in fact alphabetical lists of words taken from an Oxford dictionary and were saved to disc for passing through the Spellcheck.

It was not until after I had done this that I realised that the files might well be of interest to other Spellcheck users and if they would like to contact me enclosing a stamped addressed envelope I will give them more details. – **Gerry Lawson, 47 Hall Park Avenue, Horsforth, Leed, LS18 5LR.**

● Well done, your enhanced dictionary for Spellcheck III is excellent, 26,666 words against a measly 5,982 in the original.

However, this does, as I feared, slow down the utility, from 1 minute 25 seconds to around 3 minutes for my 1000 word test file.

But this is more than compensated for as only 33 (instead of 79) words could not be found in the dictionary and were therefore marked for manual checking.

I note also that Mr Lawson has thoughtfully included a file of 547 British town names in his dictionary, which he doesn't mention in his letter.— *Mike Mahon.*

Win a tenner

● Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Writers of the most interesting letters receive a £10 prize.

Dollar mystery

I HAVE bought an Epson FX80 printer and have written a few graphics programs for it.

When trying to print out these programs, all I got was the top right hand corner of the screen and the rest of it was coloured black.

Is it possible to get a printout of the whole screen, or am I stuck with just a quarter of it?

Another problem I have with it is that it won't print the dollar sign, instead it prints:

¤

Why is this, and can I get my dollar sign back? – **S. R. Hyde, Hr. Kinnerton, Chester.**

● The whole screen can easily be printed using the dump program published in the January 1984 issue of *The Micro User*.

With regard to your second problem, you appear to have the Swedish character set selected.

You can select the English set by changing the DIP switch inside the printer so that switch 1-6 is on and 1-7 and 1-8 are off.

Alternatively, you can type:

```
VDU 2,1,27,1,82,1,3
```

on your micro each time you switch your printer on.

Master disc problem

I HAVE read Rory McCloy's articles on the BBC Master with much interest as my reasons for changing from a model B to the Master were much the same as his.

What defeats me is how he got his old discs, which were Watford DFS format, to load into the Master, which is Acorn DFS. This is a problem that I have not been able to overcome.

An easy answer would be much appreciated as at the moment I am having to re-enter everything via the keyboard. – **D. Budge, Dunvegan, Isle of Skye.**

● It is not possible for the Acorn DFS on the Master to read the double length catalog of discs formatted under the Watford DFS.

If you still have your Model B, using it you could *COPY the files you wanted on to a disc with a "small" catalog which can be read by the Acorn DFS.

The only suggestion I can make if you only have the Master is to purchase the Advanced 1770 DFS from ACP.

I reviewed this in the December issue of *The Micro User*. It is fully compatible with your large catalog, Watford discs and has many other features for the Master. – *Rory McCloy.*

Data protection

I WAS pleased to see that you have been drawing the attention of data users to the need to register under the Data Protection Act.

Perhaps, however, you will allow me to correct some possible misapprenhensions which could arise from Jo Stork's article "The Data Protection Act: should your business be registered?" which appeared in the July 1986 issue of The Micro User.

The estimate of between 500,000 and one million data users having to register is rather higher than the 300,000 figure our research suggested and it would be interesting to know how these higher figures were calculated.

I would like to emphasise that if your readers hold data on their home computer solely for personal, family or household affairs or recreational purposes they do not need to register.

The Act is not the result of an EEC directive. The government had two principal aims when introducing the Act. The first was to establish a set of safeguards designed to protect individuals (you and me) about whom information is held on computer.

And the second was to enable the United Kingdom to ratify the Convention on Data Protection adopted by the

→

From Page 161

Council of Europe (which is an international body distinct from the EEC) in order to protect British trading interests.

Those countries which have ratified the Convention could otherwise have placed constraints on transnational data flows to and from the UK.

Although I welcome the fact that the article aims to encourage compliance by data users, through setting out eleven points as guidelines, these do contain some suggestions which are not required by the Act and in a few cases could be misleading.

An individual employee such as the person responsible for monitoring compliance within the data user's organisation does not have to register. Registration only applies to the legal person (generally an organisation) who is reponsible for and has control of the data, known in the Act as the data user.

After 11th November, 1987 it will be possible to obtain copies of information held about yourself, but not about your next of kin. Nor can you ask for data about next of kin to be corrected; this only applies to data about yourself.

The number of people who may access personal data held on the computer is a matter for each organisation to decide and will be influenced by the need to take appropriate security measures to avoid unauthorised access to, disclosure, or destruction of the personal data.

Similar considerations would apply to the reliability of those staff who have access.

Data including the details of individuals may be passed to other organisations if this is properly registered or covered by an appropriate exemption – for example the disclosure might be required by law.

The data must also be obtained fairly and lawfully. It is not a requirement of the Act in these circumstances to notify the individual concerned.

I entirely agree with Jo Stork that data users are wise to register. They should not ignore the fact that my office has now set up an investigation department and that the penalties for breaches of the Act in certain cases can involve unlimited fines.

Those readers who would like more information are most welcome to contact my office. – **E. J. Howe, Office of the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK7 5AX. Telephone Wilmslow, (06025) 535777.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

£10 Prize letter

Thrusting ahead

HERE are some tips on Thrust, Superior Software's latest release. Beginners have some trouble manoeuvring at first, so here are some hints on that.

When moving down let gravity take you. The only time you should face down is when shooting at something.

When moving left and right in the tunnels, do not face directly left or right but run up the screen a bit as well.

To brake, turn in the direction opposite to the way you are facing and thrust.

To collect the Klystron pod, make a slow descent above it (by jabbing thrust every now and then on the way down) and when you are just less than a centimetre above it, hold down thrust and tractor beam at the same time until the pod is received.

To collect the fuel pod get above the fuel and keep down the tractor beam. While doing this, move your ship around if necessary to stop yourself crashing.

Completing a level (in other words getting the pod and hyper-spacing) makes the limpets on the next level less aggressive.

When entering a space occupied by limpets, and if they are firing a lot, it is worth adopting the following tactic:

Drop into the space occupied by the limpets with your shields on all the time, rotate towards a limpet gun, let your shields off and fire. Operate your shields again if necessary, rotate and kill the rest.

While doing this don't forget to thrust to stop youself crashing. It may seem hard at first, but this is well worth doing in the end.

Any level from 1 to 5 can be skipped by shooting the reactor until critical, and then hyper-spacing.

If you have the Klystron pod, shoot the reactor and hyper-space for a 2000 bonus.

The first six screens are original, then you get the same six screens with reverse gravity, then again on the invisible level (this I assume, I haven't got past the reverse gravity level yet), and then with reverse gravity and invisibility mixed together.

I hope these tips help other readers who play Thrust.

Thank you for a fine magazine. – **Alex Hunsley, Fenham, Newcastle Upon Tyne.**

80 to 40 tracks

COULD you please tell me if it is possible to copy an 80 track disc on to a 40 track and if so what equipment I need? – **Neil Conroy, Aberdeen.**

● You cannot copy a full 80 track disc on to a 40 track one, but it can usually be copied on to two.

You need a dual 40/80 switchable drive with drive 0 switched to 80 and drive 1 to 40. Put your 80 track disc in drive 0 and a formatted 40 track disc in drive 1 and enter

```
*COPY 0 1 *.*
```

This will copy as much as will fit on to a 40 track disc. If you get a "disc full" error, you must insert another 40 track disc and *COPY each file that has not been copied (use *INFO *.* for a list of files).

Occasionally you will find that the second 40 track disc fills and you have to use a third.

This is because the catalog uses half a track, so an 80 track disc has in effect 79.5 tracks for your data.

If full it would contain more data than would fit on to two 40 track discs with 39.5 (79) free tracks each.

Do any of our readers know a quicker way of creating the second 40 track disc?

Random numbers

I WRITE my programs in machine code and especially with arcade type games, have the need for a random number.

Usually I have to be satisfied with some strange byte in memory which seems to be continually changing. But I recently discovered the following in a topic of statistics:

A pseudo-random sequence of integers can be generated from the equation:

$$x(n+1) = (ax(n)+b)\text{MOD } m$$

where a, b and m are integers and $x(n+1)$ is the integer following $x(n)$ in the sequence.

The equation will generate integers between 0 and $m-1$ inclusive and will repeat itself after a time.

For the equation to produce a sequence which will include every integer between 0 and $m-1$ the following conditions must be satisfied:

Firstly b and m have no common factors. Secondly $a-1$ is a multiple of every prime number which will divide into m.

Finally a–1 is a multiple of 4 if m is.

Using the information I calculated that – if m=256, a=5, b= any odd integer.

Then the equation becomes:

$$x(n+1) = (5x(n) + \text{odd integer})\ \text{MOD}256$$

and will generate every number between 0 and 255 inclusive.

By changing the value of b to another odd integer another sequence containing the same integers can be formed.

When writing the machine code for this it becomes obvious that all hi-byte manipulations could be ignored and this would satisfy the MOD256 at the end of the equation. Therefore the code becomes:

```
LDA rand
ASLA : ASLA : CLC : ADC rand
CLC : ADC#21 : STA rand
```

To recap this will generate a single integer in the byte rand *and if the routine is called 256 times it will generate every integer between 0 and 255 inclusive.*

In this example the value of b is 21, but could be any other odd number and would produce a different sequence. Remember that this is not truly random but only pseudo-random. – **Simon Bartrham, Bramhall, Cheshire**

Help in the mines

HERE are a few more tips for playing MicroPower's great graphic/adventure game, Doctor Who and the Mines of Terror.

If you want to jump higher than usual, jump then press U. The timing is vital, but normally a quick press after you jump should work.

This appears to be a bug but works well, even if it is sometimes tricky to get the best effect.

If you have a floor just above your head with only a small gap above you, use this jump to reach the floor above, as it also allows you to jump through certain things.

The only time this fails is if you use it to leave the greenhouse into space (which is possible and is an easy way to get back to the lift from the greenhouse) then jump – this causes a very long fall and death.

In many places a smooth vertical wall can be used to jump on to and off quickly to gain extra height. The small floors next to the lift can be ascended this way. However, it also helps in many other places.

Both the above can be used together to get quickly to the Time Instant Replay Unit.

To do this go from the far left hand end of the factory – at the end of the monorail, against the wall into space, as high as you can get.

Then jump against the wall from about four paces away, jump quickly right and very quickly press U. Hey-presto, you jump through the floor above and end up just right of the TIRU.

The anti-gravity mat, found in the greenhouse, can also be used to gain height. To do this place the mat on the floor, stand on it and jump. To go down again press down.

Now can anyone tell me:

- *How to disable the robots and turn them into boxes on stairways.*
- *What to do with the circuit boards, packing cases, explosives, memory capsule, crystal, pass card, stool and heatonite ore?*
- *How to get the heatonite ore and the stool in the first place – I haven't yet seen them.*
- *What to do in the reactor, as I can find nothing useful to do here except get the bonus for attending the cyrogenic sleep chamber that is found around there.*

Here's a useful tip for Mirrorsoft's Strike Force Harrier.

You can break the light barrier (tricky!) by hovering stationary at any height, then flipping upside down quickly and watching the result on your FOFTRAK.

This is a completely ridiculous move in reality, but is about the only way to reach the enemy H.Q. within 72 hours of starting a game.

One problem with this move is that missiles still catch up with you – goodness knows how! I have only ever evaded a few in the months I've had the game! – **N. J. Sharratt, Stapenhill, Burton on Trent.**

£10 Prize letter

More on Life

I FIND the Life program in the November issue of The Micro User *very interesting. It was quick to enter and produced exciting results.*

However, I have found some improvements which might be of interest to other readers.

Firstly, if you move the statement at 1430 to line 1465, there is continuity up and down across the top and bottom of the window.

Also, I got tired of designing initial screens and inserted the following line:

```
655IFK%=82THENGCOL0,2:VDU5:
REPEAT:MOVE32*RND(38)+2,16*
RND(60)+46:VDU224:UNTIL INK
EY(3)>0:VDU4
```

which generates random sprites.

You press R to start it, and any key to stop. It then returns to the usual manual method of designing.

If you do this it is necessary to define the sprite as follows:

```
100VDU23,224,&E0,&E0,&E0,0,
0,0,0,0
```

– **David Crennell, Chilton, Didcot, Oxon.**

Merging records

I HAVE recently purchased Mini Office II on disc for my BBC Micro and have been very pleased with it.

Your articles in The Micro User *are very interesting and I have found them extremely helpful.*

In the October 1986 issue Louise Colinson wrote an article on merging a database file with the word processorm which I have used successfully, but the problem I am having is in merging specific records from a file.

Can I send the same letter to only, say, six records of my choice from a file of 38 records without having to print all 38? If this can be done could you please let me have details. – **J. W. Simmons, Kingston, Hants.**

● You can only merge a complete database file into the word processor, but if you answer 6 to the question "How many copies:" you will only get the first six of your 38 printed.

If these are not the required records, the solution to your problem is to create a file from the database containing just the six records you want to merge.

To do this, mark the records you want either by using the Search data option or by pressing M while you are in the edit mode of the database and the required record is being displayed.

If you then save marked records you will have a file containing just the records that you want to merge into the word processor.

Disc protection

I am working on a new type of disc protection, and want to know how to write to a disc when a write protect tab is present.

I know that you are not meant to write to a protected disc, but it must be possible somehow.

Also where can I get details of all osword &7F error messages. – **Neil Fedorowycz, Scarborough, Yorks.**

● On a BBC Micro it is impossible to write to a disc that is write protected, except by modifying the hardware.

Details of the main osword &7F errors are described in the second of a series of three articles about the 8271 disc controller, which started in the January 1986 issue of *The Micro User*.

Speech utility

HERE is a useful utility for all of you with Superior Software's excellent Speech!

*Type *speech and run this little program before typing in or loading your own.*

Then when function key 9 is

→

From Page 163

pressed all the data in your program is read back to you, making checking for mistakes much easier. – **Marcus Taylor, Connon Bridge, Scotland.**

```
    1 *KEY9 32767 DATA END|
MVDU28,0,1,39,0|MCLS|MINPUT
TAB(0,0)"READ FROM LINE ";L
%:VDU26:RESTORE L%:REPEAT:R
EAD W$:OSCLI"*SAY"+W$:UNTIL
 W$="END"|M
```

Bug Eyes solution

HERE'S my solution to Audiogenic's game Bug Eyes II.

Make your way to the lift shaft collecting any keys. Go down one level and exit to the right. Use the ladder to the right to go above the three aliens.

If on the next screen there is a key, collect it otherwise make your way under the three aliens until you reach Butch's kennel. Collect the key and return to the lift shaft.

Exit on the next level right and you will appear at another shaft.

Go down one level. Collect any keys and fall through the gap at the bottom.

You will appear above a dragon. When it makes its way left, run right and fall above the key. When you land, run left and drop.

Go right and on the next screen collect the key. Go left as far as possible until you appear in a screen with only a ladder. Go up this and go to the right avoiding the cream.

As soon as you appear go right to avoid the cream and then up the ladder. Go left and up the ladder as far as possible.

Collect the key using the moving platforms, fall down the gap on the very left edge then take the exit right to the lift shaft.

Exit the next level down and another shaft will appear. Exit one level up, go up one screen and then left for two screens. Go right and fall off the edge on the far right screen.

Go left collecting any keys and fall down through the gap. Go right and fall off the edge collecting any keys and drop below the pink alien. You will land on a small blue platform.

Keep your right key down and you will appear halfway up the next screen. You will drop. Go back to the screen to the left and collect the key in mid-air.

Go again to the right, up the ladder then run past the dragon to the right. If there is a key, collect it otherwise fall through the gap on the left.

Collect the key under the spider and go right and up the platform on its very left edge. If there is a key collect it otherwise go up on the ladder's far right-hand edge.

Carry on going up collecting keys and at the top go left to a lift shaft. Go up to exit right and to clear the next screen go up the ladder through the yoyo strings.— **Simon Lock, Streetly, West Midlands.**

Confessions of a faint-hearted Micro User

No joy from homework

Dear Trev,

Sorry if my handwriting is a bit shaky but I'm still recovering from an argument with Doreen. Remind me to stick to micros in future, I'm retreating from the battle of the sexes.

In case you think me a coward, you're right. Where Doreen's concerned I am. There's definitely a case for a strategic withdrawal. And, as you might know, the row was all about interfacing.

The trouble started when Doreen tweaked me on the knee in the Ram and Buffer and said "We really should get serious".

My heart stopped and I got the same feeling I get when I open a copy of Squirrel Abuser in my nightmares. I knew that something awful was about to happen but there was nothing I could do about it.

"Yes, serious. We've messed about too much, we'll have to get down to some proper programming".

I was so relieved that I'd agreed to go to a nightschool course on computer science before I realised I hadn't even asked Andrea's permission. Happily she'd already decided to do a course on "Bell-ringing for women". When Clive heard about it he chimed in that he'd have a go at it if he could be guaranteed a redhead. As it was he was refused entry – apparently you needed a lot of pull to be enrolled. By way of consolation he joined Doreen and me on the computer course. So that was how the three of us turned up at Romchester Polytechnic – known to locals as the Poly and to its students as the "Dead Duck". It wasn't more than five minutes before we began to form an escape committee.

I suppose it was our fault for starting it but what can you expect when Ludwig, the lecturer, turned up wearing an eyepatch and talking of injuries received from an accident using turtle graphics? And then he made it worse by saying he'd ask us a few questions to bring us out of our shells. Surely he was begging for it when he demanded "What's a megabyte?"

Even so he wasn't too impressed when we all chorused "Anything it can get its teeth round".

Mind you he got his revenge when Clive started boasting about the superiority of his printer which had Near Letter Quality print.

"What's so good about that?" Ludwig yelled dismissively, "any fool can join dots".

By the end of the first lecture he'd thoroughly demoralised us. After informing the class that Basic was a dead language he plunged into machine code in general and the BBC operating system in particular. Of course none of us had brought any paper so Doreen had to make notes on the back of her hands. We got some very funny looks when she later walked into the Ram and Buffer covered in osbytes.

But that wasn't what caused the bust-up. It was the homework. We had to write a program that used joysticks and later we were to modify them so that they worked on the robot arm Ludwig had in the classroom. The trouble was that while I had a pair of joysticks they were the wrong type to work on my Model B – of course, a present from Andrea. But they would work on the Compact that Doreen had won at school for being the last teacher to have a nervous breakdown that term. (I still have the bruises from fainting before she reached the end of "Bob, I think I'm going to have a baby beeb".) A perfect combination you might think. Alas no. Never program with a woman.

I can't remember exactly what started the argument but it must have been something bad because it soon went downhill. I said that she only wanted me for my joystick and she retorted that it certainly wasn't for my ram. (I may have only 32k but I'm firmly of the opinion that it's what you can do with it that counts.) My response was that this was the last time I ever programmed with a woman to which she responded that she looked forward to programming with a man. (I think she's been taking lessons from A.)

And that's where it stands. We just sit at nightschool and glare at each other. At times it's got so bad that Ludwig's swopped his patch to the other eye. Things can only get better.

yours,

Bob

PS: Joy! Clive figured out how to interface the robot arm to the beeb. Now every time Ludwig sneers it has him by the throat!

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SNAP!
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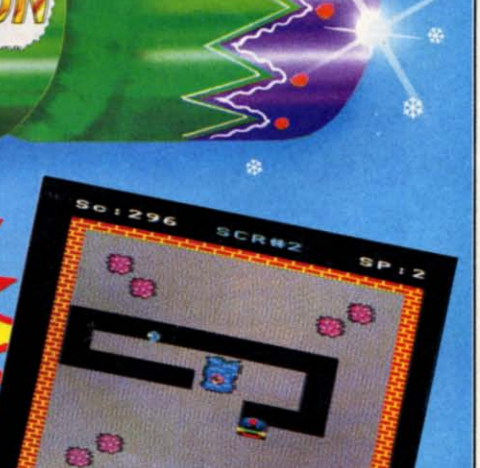

TO ORDER TURN TO THE FORM ON PAGE 167

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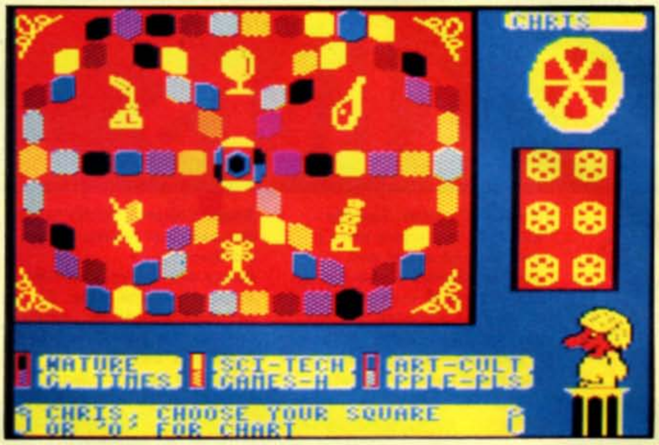

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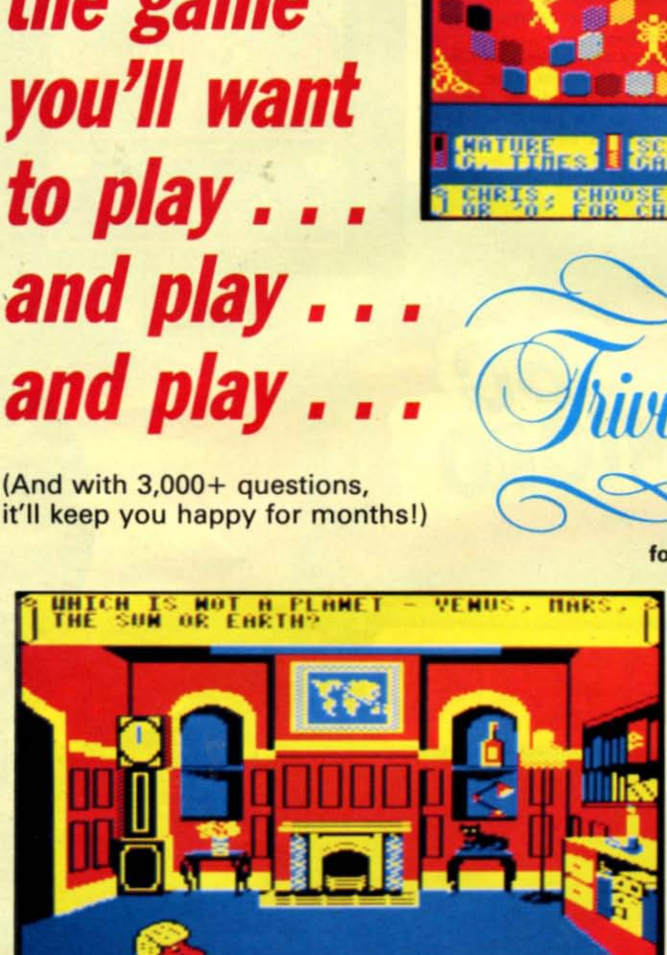

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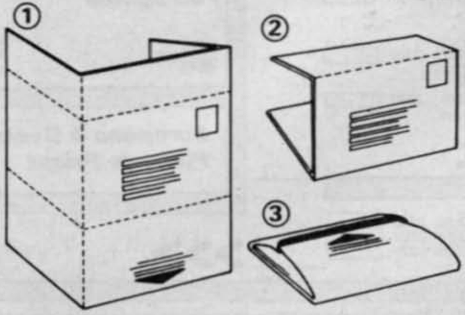

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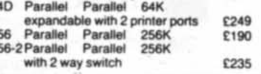

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Advertisers' Index

21st Software ... 14
4 Mation ... 40
Advanced Tech Products ... 100
Advanced Tech Research ... 52
Amcom Software ... 128
B & S Computing ... 158
Beebug ... 3,15-18
C&F Associates ... 114
CA Special Products ... 159
CJE Micros ... 8
CMS Soft ... 131
CP Microsystems ... 122
Cantocks Enterprises ... 159
Care Electronics ... 42
Carey Electronics ... 114
Carswell Computers ... 169
Ceedsoft ... 169
Centec ... 159
Chalice Software ... 139
Clares Micros ... 50
Computaccount ... 6
Computech ... 169
Computer Concepts ... 82, 83
Computer Express ... 157
Computer Repairs ... 157
Contex ... 128
Data Store ... 157
Database Software ... 55, 69, 79, 126, 127, 153
Design People Software ... 134
Direct Disk Supplies ... 48
Disking International ... 30, 31, 136
Doctor Soft ... 157
Flora Electronics ... 170
GDP Systems ... 44
Goto Computers ... 61
H.C.R. Electronics ... 148
HSV ... 64
Incentive Software ... 65
Keyzone ... 169
Kosmos Software ... 65
LCL ... 70
Leigh Computer Systems ... 131
Linear Graphics ... 66
Logotron ... 76
Mancomp ... 133
Micro Media ... 23
Microdis ... 158
Microlink ... 128, 149
Microman Computers ... 36
Micronet ... 142, 143
Mighty Micro ... 170
Minerva System ... 146
Minic Business Services ... 169
Miracle Technology ... 10
Morley Electronics ... 160
Number One Systems ... 134
Opus Supplies ... 13, 35, 97
Outlook Enterprises ... 70
P&H Electronics ... 74
Pace ... 80
Paul Fray ... 170
Peter Donn ... 159
Pineapple Software ... 146
Ptarmigan Software ... 76
Qual Soft ... 145
R & D Speech Tech ... 70
Revansoft ... 135
Rock Hall ... 170
S.P.Electronics ... 169
Selec Software ... 148
Silicon City ... 134
Soft Services ... 101
Softlife ... 159
Software Images ... 148
Solidisk Technology ... 24-29
Squirrel Soft ... 61
Superior Software ... 2, 116, 171, 172
Synergy Software ... 94
System Software ... 52, 131
Technomatic ... 84-92
Twillstar Computers ... 154-156
Vine Micros ... 122
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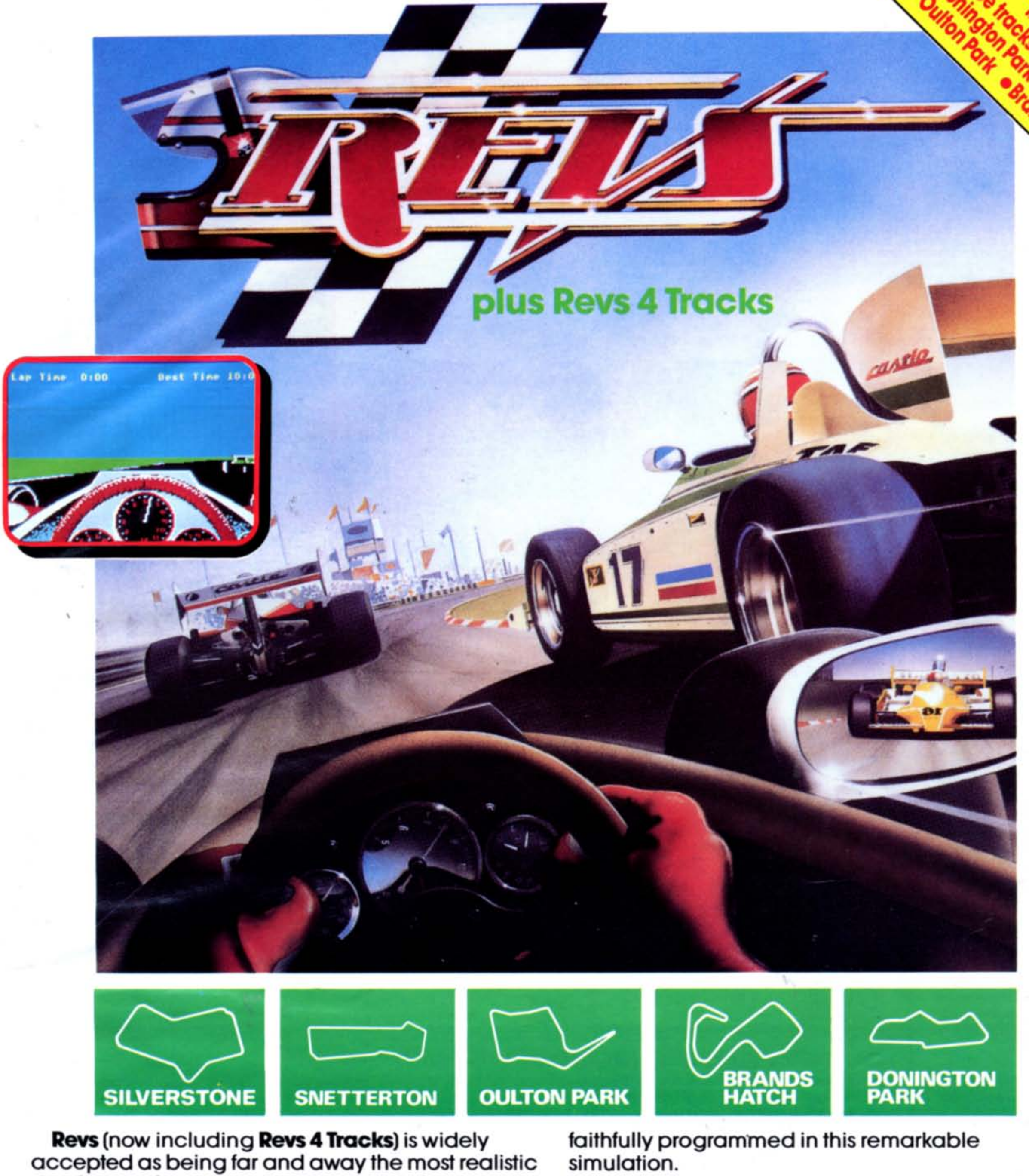

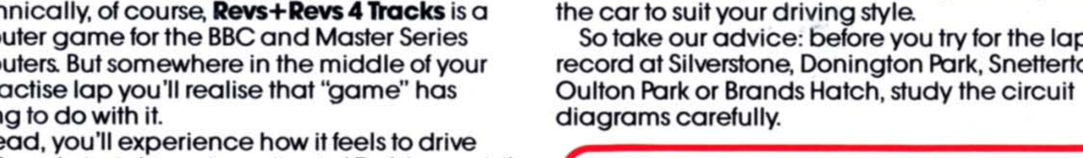

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For the COMMODORE, AMSTRAD, BBC MICRO, ELECTRON

REPTON 3

THE ULTIMATE CHALLENGE

The Screen Editor.

The Character Editor.

Being pursued by a Monster

The Time Bomb is located

The Poisonous Fungus grows insidiously

Collecting a Golden Crown

Are you ready for the ultimate challenge?

Our original Repton game was immediately acclaimed as a refreshingly new concept: a game requiring dexterity to complete its arcade-style elements, and clear logical thinking to solve its strategic puzzles. Repton involves retrieving treasure from cleverly-constructed traps of falling rocks whilst avoiding the fearsome monsters and haunting spirits. "This is an astounding game reaching new heights in BBC arcade adventures," enthused the Micro User magazine.

Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!"

Now, completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-designer is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds . . . any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 24 fascinating screens, and players who are skilful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: a creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 4th dimension); and golden crowns as well-deserved rewards for your endeavours. **Can YOU complete Repton 3?**

PRIZE COMPETITION

If you complete Repton 3, you can enter our competition. Prizes include over £200 in cash, with T-shirts, mugs, badges and pens for runners-up.

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The screen pictures above show the BBC Micro version of Repton 3.

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